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ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2013

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

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NOTE: Under Committee Rules, Mr. Rogers, as Chairman of the Full Committee, and Mr. Dicks, as Ranking Minority Member of the Full Committee, are authorized to sit as Members of all Subcommittees.

Rob Blair, Joseph Levin, Angie Giancarlo,
Loraine Heckenberg, and Perry Yates,
Staff Assistants

PART 7

DEPARTMENT OF ENERGY

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Department of Energy—Nuclear Energy and Nuclear Regulatory Commission, FY 2013 Budget **177**

Printed for the use of the Committee on Appropriations

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ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2013

TUESDAY, FEBRUARY 28, 2012.

U.S. DEPARTMENT OF ENERGY

WITNESS

HON. STEVEN CHU, SECRETARY, U.S. DEPARTMENT OF ENERGY

Mr. FRELINGHUYSEN. Good afternoon, everybody. I would like to call this hearing to order.

Secretary Chu, I would like to welcome you back once again to the subcommittee. I understand through the grapevine that today is your birthday. Is that correct?

Secretary CHU. That is correct.

Mr. FRELINGHUYSEN. And that it is also your wedding anniversary.

Secretary CHU. That is correct.

Mr. ROGERS. What is he doing here?

Secretary CHU. That is a good question.

Mr. FRELINGHUYSEN. We appreciate your being here, of course.

And you are here today to present the administration's fiscal year 2013 budget request for your department. Your request totals $27.2 billion—a $1.5 billion, or 5.7 percent, increase from the fiscal-year-2012-enacted level. Nearly one-third of that increase comes in one program: Energy Efficiency and Renewable Energy.

Your request is painfully thin on its specifics, and we need to know why this funding is both necessary and a prudent use of taxpayer dollars. And given that consumers are angered by higher gas and oil prices and one major energy source, fossil energy, is substantially cut from last year, how does your budget relate to the real world outside of Washington, where energy costs are eating up family budgets?

On top of that, the public's faith has been shaken by revelations that many programs under your jurisdiction have wasted taxpayers' dollars and created markets for various renewables that cannot be sustained without further infusions of Federal support. Artificial markets plus the reality of wasted dollars undermine the real economy which exists outside this city.

We know all too well the problems the loan guarantee program has faced so far. Solyndra has become its public face. We don't know what will be the next shoe to fall, but we have great reason to be concerned. Back home, many people are, frankly, disgusted that some of these investments have been wasted. They now seriously question the proper government role in energy markets and the levels of risk that you and those subordinate to you have taken over the past 2 years.

The Allison report on the loan guarantee program noted that the failure rate of the program to date has been less than some had projected. While I respect the expertise and judgment of Mr. Allison and the need to do political damage control, all loan guarantee opportunities, for whatever purpose, will now be painted with the same brush. The loss of public confidence is difficult to calculate. Are there lessons you have learned from this?

Energy projects fail in the marketplace; we know that. But if political directives were behind any project selection, then our fears would be justified. You may have seen a report by The Washington Post on February 14th which alleged that as much as $3.9 billion of your funds may have been improperly influenced by appointees. Now the White House must show that the election year is not dictating this budget's spending plans.

I put Yucca Mountain in the same box. The administration has tried to kill this project, wasting billions of dollars to accommodate Senator Reid—mind you, not on any sound scientific grounds, which you yourself have said, Mr. Secretary. Now your budget request contains funding for projects to implement some of the Blue-Ribbon Commission's recommendations—recommendations which Congress has not blessed either in whole or in part. As the current law of the land is for waste disposal at Yucca Mountain, we need to hear from you if the administration is proposing any legislative changes to authorize their recommendations.

On a more positive note, you have made some tough decisions to support the nuclear security programs at the NNSA—decisions which this country has been demanding for some time. Nuclear security programs are the most vital mission within your portfolio.

While I have significant concerns about the administration's call for reduced military spending, we showed last year that our national security can be sustained and even improved with less money. And it will be the administration's task to show that your fiscal year 2013 request does not sacrifice our strategic security for budgetary savings.

And together, the administration and Congress have supported the development of small modular reactors, another positive development, as was the recent groundbreaking for two nuclear reactors in Georgia.

Mr. Secretary, last year we wrestled with how to put together a budget for your department that was fair and balanced. I am proud of our product. And I want to thank my ranking member, Mr. Visclosky, once again, as a former chairman and ranking member for his many contributions, his sound advice, experience, and that very essential institutional memory.

Our joint task this budget cycle is no different: funding the right balance of investments for our most critical needs with an eye toward those that protect our Nation; and, yes, create private-sector jobs, sustainable jobs and opportunities, not jobs which rely on government largesse. I hope you will be able to explain today how the budget request before us does just that.

Secretary Chu, please ensure that the hearing record, questions for the record, and any supporting information requested by the subcommittee are delivered in final form to us no later than 4 weeks from the time you receive them.

Members who have additional questions for the record will have until the close of business tomorrow to provide them to the subcommittee office.

With that, I turn to my ranking member, Mr. Visclosky, for any comments he may wish to give.

[The information follows:]

OPENING STATEMENT

The Honorable Rodney P. Frelinghuysen
Chairman, Energy and Water Development Subcommittee

House Committee on Appropriations

Hearing on the Department of Energy's Fiscal Year 2013 Budget Request

February 28, 2012

I would like to call this hearing to order. Good morning, everyone. Secretary Chu, I'd like to welcome you back, once again, to the subcommittee. You're here today to present, and explain, the Administration's fiscal year 2013 budget request for the Department of Energy.

Your request totals $27.2 billion, a $1.5 billion, or 5.7%, increase from the fiscal year 2012 enacted level. Nearly 1/3 of that increase comes in one program – Energy Efficiency and Renewable Energy. Your request is painfully thin on specifics for this increase, and we will need to know why this funding is both necessary and a prudent use of taxpayer resources.

And, given that consumers are angered by higher gas and oil prices, and one major energy source, fossil energy, is substantially cut from last year, how does your budget relate to the real world outside of Washington where energy costs are eating up family budgets?

On top of that reality, the public's faith has been shaken by revelations that many programs under your jurisdiction have wasted taxpayer dollars and created markets for various renewables that cannot be sustained without further infusions of federal support. Artificial markets, plus the reality of wasted dollars, are not a happy situation in the real economy which exists outside this city.

We know all too well the problems the loan guarantee program has faced so far. Solyndra has become its public face. We don't know what will be the next shoe to fall, but we have great reason to be concerned. Back home, many people are frankly disgusted that these investments of taxpayer dollars have been wasted. They now seriously question the proper government role in energy markets and the levels of risk you, and those subordinate to you, have taken over the past two years.

The Allison Report on the Loan Guarantee Program noted that the failure rate of the program to date has been less than some had projected. While I respect the expertise and judgment of Mr. Allison and the need to do political damage control, all loan guarantee opportunities, for whatever purpose, will now be painted with the same brush. The loss of public confidence is difficult to calculate! Are there lessons you've learned?

Energy projects fail in the marketplace – we know that. But if political directives were behind any project's selection, then our fears have been justified. You may have seen a report by The Washington Post on February 14th which alleged that as much as $3.9 billion of your funds may have been improperly influenced by appointees. Now the White House must show that the election year is not dictating this budget's spending plans.

I would put Yucca Mountain in the same box. The Administration has tried to kill this project, wasting billions of dollars, to accommodate Senator Reid, not on any sound scientific grounds – which you yourself have said, Secretary Chu. Now, your budget request contains funding for projects to implement some of the Blue Ribbon Commission's recommendations – recommendations which Congress has not blessed, either in whole or in part. As the current law of the land is for waste disposal at Yucca Mountain, we need to hear from you if the Administration is proposing any legislative changes to authorize their recommendations.

On a more positive note, you made some tough decisions to support the nuclear security programs at the NNSA, decisions which this country has been demanding for some time. Nuclear security programs are the most vital mission within your portfolio. While I have significant concerns about the Administration's call for reduced military spending, we showed last year that our national security can be sustained, and even improved, with less money. And, it will be the Administration's task to show that your FY2013 request does not sacrifice our strategic security for budgetary savings.

And, together, the Administration and Congress supported small nuclear reactors, another positive development as was the recent groundbreaking of 2 new nuclear reactors in Georgia.

Mr. Secretary, last year we wrestled with how to put together a budget for your Department that was fair and balanced. I was proud of our product, and I want to thank my ranking member once again for his many contributions: His sound advice, experience and institutional memory. Our joint task this budget cycle is no different: funding the right balance of investments for our most critical needs, with an eye towards those that protect our nation and that create private sector jobs – sustainable jobs and opportunities, not jobs which rely on government largesse. I hope you will be able to explain today how the budget request before us does just that.

Secretary Chu, please ensure that the hearing record, questions for the record, and any supporting information requested by the subcommittee are delivered in final form to us no later than four weeks from the time you receive them. Members who have additional questions for the record will have until close of business tomorrow to provide them to the subcommittee office.

With that, I'd turn to Ranking Member Visclosky for any comments he may have.

Mr. VISCLOSKY. Mr. Chairman, thank you very much. And I know my entire statement will be entered into the record.

First of all, I would thank you for your kind words and reciprocate. I told a group this morning that I am blessed in life, obviously, for many, many reasons, but one of them is to serve on this subcommittee, because all of us together want a strong Nation, a good sound energy policy, as well as the economic development that can follow from an investment in our water infrastructure. And you have done a great job in bringing us together and, again, resolving differences and making sound judgments. So I appreciate that very much.

Dr. Chu, I also congratulate you on your wedding anniversary and birthday. Had this not been a leap year, you would be just 1 day before my son's birthday. So I congratulate you for that and do welcome you to the subcommittee for your fourth appearance.

I am pleased that President Obama continues to recognize the energy challenges facing this Nation. And I appreciate the budget's strong statement that America will not cede leadership in clean energy.

Additionally, I certainly believe that we need to be more conscientious about our energy consumption and further advance our conservation efforts. We need a strong yet balanced approach to energy research and development that effectively nurtures basic sciences, leading to significant technological demonstration, deployment, and commercialization—these efforts with a goal in mind toward ensuring production in America of these findings.

I cannot emphasize my last point strongly enough. I see very little or no merit to the Department fostering technological advances or breakthroughs for products that will not ultimately be manufactured domestically.

The government can drive the policies. However, I am, as I have said before, very concerned about making sure that the Department exercises strong leadership and fundamental management reform. They do need to be forthcoming at the Department of Energy. If not, it will significantly inhibit the chance of a successful energy policy.

I know contract and project management seem tedious and dull. I certainly am tired of bringing it up year after year, administration after administration, and actually believe you are now the seventh Secretary of Energy I have questioned on the topic. I continue to be appalled at the cost overruns and schedule slips of the Department of Energy's major construction projects.

In 2009, this subcommittee had a hearing on the Department's continued appearance on GAO's high-risk list, a position it has held since 1990. Given the challenges in the last year on major construction projects, I fear that not much has changed. And I do hope you can provide assurances today that you are taking significant, strong actions to get the Department off the list.

The chairman has noticed some areas of concern, particularly the Department's decision and actions on Yucca Mountain. I speak for myself when I indicate that I share his concerns in that regard.

I would also add my very serious reservations about the inclusion of a $150 million request for USEC within the nonproliferation budget request. I hope to hear from you and others in the Department about why, when coupled with the transfer authority request for fiscal year 2012, the Department believes providing USEC with $300 million in taxpayers' money is a good investment and not a bailout.

Mr. Secretary, I do look forward to hearing from you today about the fiscal year 2013 budget request that will help address energy and national security challenges. None of us will always agree, but certainly, as a member of this subcommittee of long standing, know that we can work through our differences in a cooperative and bipartisan fashion.

And, again, Mr. Chairman, I appreciate your yielding the time.

[The information follows:]

Visclosky Opening Statement at Hearing on Dept. of Energy FY13 Budget with Secretary Chu

February 28th 2012

Subcommittee Ranking Member Rep. Pete Visclosky

Good afternoon. Dr. Chu, welcome to what I believe is your fourth appearance before the Subcommittee.

I am pleased that President Obama continues to recognize the energy challenges facing this nation with this budget request and I appreciate the budget's strong statement that America "will not cede leadership in clean energy." That being said, the nation does not yet have a comprehensive energy policy for the 21st century. And our current ad-hoc policy continues to imperil our economy, our national security, and our environment. The energy crisis is not just about insecure oil supplies from the Middle East, but about the cost it inflicts on hardworking Americans, the national security threat it poses, and the havoc it wreaks on the environment. We need to change the entire energy mix, introduce competition into the system, and ensure that we are not captive to any one source of energy. In addition, we need to be more conscientious about our energy consumption and further advance our conservation efforts.

The Department of Energy features a broad portfolio of research and development efforts. Given the substantial short-, medium-, and long-term energy challenges facing the nation, we need a strong, yet balanced approach to energy research and development that effectively nurtures basic sciences, leading to significant technology demonstration, deployment and commercialization efforts with a strong bias toward improving American manufacturing. I cannot emphasize my last point strongly enough. I see very little merit to the Department fostering technological advances or breakthroughs for products that are not ultimately manufactured domestically.

The government can drive the policies and incentives for a more robust energy mix and smarter energy consumption. However, as I've said before, no matter the policy set forth, if strong leadership and fundamental management reform are not forthcoming at the Department of Energy, it will significantly inhibit the chance of a successful energy policy as well as the Department's credibility.

I know contract and project management seem tedious and dull, and I certainly am tired of having to bring it up year after year, Secretary after Secretary. I believe you are actually the seventh Secretary I have questioned on the topic. However, I continue to be appalled at the cost overruns and schedule slips of the Department of Energy's major construction projects. In 2009 this Subcommittee had a hearing on the Department's continued appearance on GAO's high risk list, a list I might add that DOE has remained on since 1990. Given the challenges in the last year on major construction projects at the Department, I fear that not much has changed since that time. I hope you can provide some assurance today that you are taking actions to improve the Department's standing in this regard.

The Chairman has noted some areas of concern regarding the Department's decision and actions on Yucca Mountain. I share his concerns in that regard. I would also add my serious reservations about the inclusion of $150 million for USEC within the Nonproliferation budget request. In the last six months, both Moody's and Standard & Poor's issued reports that painted a pretty bleak picture of USEC's financial situation. For example, S&P states that USEC has a "'highly leveraged' financial risk profile and 'vulnerable' business risk profile." Further, S&P gives USEC a "below average" Quality Ranking and on S&P's measure of investment desirability, USEC scores lower than 93 percent of all companies for which a report is available. So I hope to hear from you why – when coupled with a transfer authority request for FY 2012 – the Department believes providing USEC with $300 million of the taxpayer's money is a good investment and not a bailout.

Mr. Secretary, I look forward to hearing from you today about how the FY 2013 budget request will help address the energy and national security challenges we face and improve the nation's manufacturing base. As we move through this process, I don't expect that we will always agree on everything regarding the Department's budget, but I do sincerely believe that we can work through those differences in a cooperative, bipartisan manner.

Thank you Mr. Chairman for the time and I look forward to our hearing today.

Mr. FRELINGHUYSEN. Thank you very much, Mr. Visclosky.

The chairman of the full committee is recognized, Mr. Rogers.

Mr. ROGERS. Thank you, Mr. Chairman. And thank you and your ranking member for doing great work over here. You are doing well.

Mr. Secretary, happy birthday, happy anniversary. Welcome.

This week, the national average price for a gallon of gas is $3.60, a jump of 20 cents over last month, 40 cents more than this time last year. In the increasingly unstable Middle East a belligerent Iran threatens to withhold its exports and shut down the Strait of Hormuz. Meanwhile, China's rapidly growing economy is driving up oil prices through increased demand, while its state-owned enterprises are securing commodity contracts around the world, monopolizing new foreign sources. Once again, energy security, key to economic prosperity and national defense, is the focus of public debate.

The Congress has sent a very strong message: that we must have balance in the expansion of conventional fuels—coal, natural gas, oil, nuclear—to provide energy today, with investment into renewable energies to power our future. And while the President has repeatedly mentioned his support for a similar all-of-the-above energy policy, this budget proposal and the recent denial of the Keystone XL pipeline, seem to insinuate that this administration is not serious about responsibly diversifying our energy portfolio.

Instead, this budget request for DOE, coupled with the budgets of Interior and the EPA, seems merely a continuance of this administration's political posturing and a diversion of scarce Federal dollars to favored energy sectors at the expense of the others. In particular, coal—so important to my region of southern and eastern Kentucky and our country's most abundant energy resource—has remained squarely in the administration's cross-hairs for extinction.

Although your budget tries to hide it, your proposal significantly rolls back investment in carbon capture, carbon storage, and the advanced energy systems that would allow our country to more efficiently use the fossil fuels already at our disposal. Instead, these funds have been shuffled around to support the President's pet projects, including a proposed $500 million increase for the Energy Efficiency and Renewable Energy Program, which is already funded at $1.8 billion.

Furthermore, as the EPA rolls out its MACT regulations and fleshes out a proposed greenhouse gas rule, these fossil R&D funds are vital to developing the new technologies necessary to comply with the administration's own control standards. Essentially, the administration has created a "catch-22," demanding that industry invest heavily into new technology in order to meet stricter standards while cutting off the funding for those investments. It is a systematic dismissal of coal, the outcome of which will be thousands of lost jobs and more expensive electricity for American citizens while their tax money is thrown at unviable solutions, like Solyndra's solar panels.

Combined with underfilling the Strategic Petroleum Reserve after last year's sale in order to create the appearance of savings, I fear your budget reduces our energy security in real terms.

Obviously, my colleagues and I have serious concerns about the administration's policies as they relate to our energy security. However, I would like to commend your department for its efforts through NNSA to maintain our strategic arsenal. I would welcome you to expand upon how your request, which includes significant reductions, ensures that our nuclear capabilities are secure, thoroughly modernized, and continue to be a sufficient deterrent to our enemies.

Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Chairman.

Mr. Dicks, the ranking member of the full committee.

Mr. DICKS. I also want to welcome Secretary Chu to the Energy and Water Subcommittee for the opportunity to discuss the fiscal year 2013 Department of Energy budget request.

And I will bet you could have thought of better things to do on your birthday and on your anniversary, but we will be brief.

For fiscal year 2013, the President's budget request for the Energy Department is a sensible proposal that carries on our investments in important national programs in defense, science, and energy efficiency. This proposal represents a further investment for many programs that are the building blocks for a more efficient and independent energy future.

This fiscal year 2013 budget request contains a small increase for naval reactors but healthier increases for other nuclear weapons activities, such as modernization, as well as the nonproliferation programs. While the increase for weapon activities is less than what was outlined in the budget document of a few years ago, the funding seems adequate for fiscal year 2013 to maintain our capability. However, I understand the administration is working on a plan to establish our requirements beyond this proposed budget.

I applaud the budget request for the healthy increase in important domestic programs, such as energy efficiency. The Energy Efficiency and Renewable Energy Program would be increased by more than $520 million over the fiscal-year-2012-enacted level. The initiatives funded under this program are important to establish and maintain our lead in both the manufacturing and deployment of new energy technologies as well as making existing technologies more efficient.

The budget request also continues adequate support and adequate spending for the cleanup of the Hanford nuclear weapons site in Washington State, which is funded through the Environmental Management Program. I want to work with the subcommittee and Energy Department to make sure that the Hanford cleanup succeeds at a reasonable cost to the taxpayer.

However, I must express my disappointment that this budget continues to reflect the administration's decision to shut down the Yucca Mountain project. It is my opinion that the decision Congress made back in the 1980s to use Yucca as our national nuclear waste repository is still the law of the land.

Again, I want to welcome Secretary Chu to the committee, and we look forward to your statement.

Thank you.

Mr. FRELINGHUYSEN. Thank you, Mr. Dicks.

Mr. Secretary, thank you for being with us, and we welcome your remarks. Your entire statement, of course, will be included in the record.

Secretary CHU. All right. Thank you.

Chairman Frelinghuysen, Ranking Member Visclosky, and members of the committee, thank you for the opportunity to discuss the Department of Energy's fiscal year 2013 budget request.

To promote economic growth and strengthen our security, President Obama has called for an "all-of-the-above strategy that develops every source of American energy." The President wants to fuel our economy with domestic energy resources while increasing our ability to compete in the clean energy race.

The Department's fiscal year 2013 budget request of $27.2 billion is guided by the President's vision, our 2011 strategic plan, and our inaugural Quadrennial Technology Review. It supports leadership in clean energy technologies, science and innovation, and nuclear security environmental cleanup.

Decades ago, Energy Department support helped to develop the technologies that have allowed us to tap into America's abundant shale gas resources. Today, our investments can help advance technologies that will unlock the promise of renewable energy and energy efficiency.

The budget request invests approximately $4 billion in our energy programs. It advances progress in areas from solar to offshore wind, to carbon capture utilization and storage, to smart grid technologies. And it helps reduce our dependence on imported oil by developing next-generation biofuels, advanced batteries, and fuel-efficient vehicle technologies.

The budget request invests $770 million in the nuclear energy program to help develop the next generation of nuclear-powered technologies, including small modular reactors. It also includes funding for the continued nuclear waste R&D, which aligns with the recommendations of the Blue Ribbon Commission on America's Nuclear Future.

As we move to a sustainable energy future, America's fossil energy resources will continue to play an important role in our energy mix. The budget request includes $12 million as part of a larger R&D initiative by the Departments of Energy, Interior, and EPA to understand and minimize the potential environmental, health, and safety impacts of natural gas development through hydraulic fracking.

The budget also promotes energy efficiency to help Americans save money by saving energy. And it sponsors R&D and industrial materials and processes to help U.S. manufacturers cut costs. To maximize our energy technology efforts in areas including batteries, biofuels, and electric grid technologies, we are coordinating research and development across our basic and applied research programs and ARPA–E.

To encourage the manufacturing and deployment of clean energy technologies, the President has called for extending proven tax incentives, including the production tax credit, the 1603 program, and the advanced energy manufacturing tax credit. As industry, Congress, and the American people make critical energy decisions, it is also important that we adequately fund the Energy Information Administration.

Competing in the new energy economy requires our country to harness all our resources, including American ingenuity. The budget includes $5 billion for the Office of Science to support basic research that could lead to new discoveries and help solve energy challenges. These funds support progress in material science, basic energy science, advanced computing, and more.

The budget request continues to support Energy Frontier Research Centers, which aim to solve specific scientific problems to unlock new clean energy development. It also supports the five existing energy innovation hubs and proposes a new hub in electricity systems. Through the hubs, we are bringing together our Nation's top scientists and engineers to achieve game-changing results.

Additionally, the budget request includes $350 million for ARPA–E to support research projects that could fundamentally transform the ways we use and produce energy. ARPA–E invests in high-risk, high-reward research projects that, if successful, could create the foundation for entirely new industries.

In addition to strengthening our economy, the budget request strengthens our security by providing $11.5 billion to the National Nuclear Security Administration. As the United States begins the nuclear-arms reduction required by the New START treaty, the science, technology, and engineering capabilities within the nuclear security enterprise will become even more important to sustaining the U.S. nuclear deterrent.

That is why the budget request includes $7.6 billion for weapons activities. It also includes $1.1 billion for the Naval Reactors Program. Additionally, it supports NNSA's work to prevent nuclear terrorism, which is one of President Obama's top priorities. It includes $2.5 billion to implement key nuclear security, nonproliferation, and arms-control activities.

Finally, the budget request includes $5.7 billion to continue progress in cleaning up the Nation's cold war nuclear sites.

The budget request makes strategic investments to promote our prosperity and security. At the same time, we recognize our country's fiscal challenges and are cutting back where we can. We are also committed to performing our work efficiently and effectively.

Countries around the world recognize the energy opportunity and are moving aggressively to lead. This is a race we can win, but we must act with fierce urgency.

Thank you. I am now pleased to answer your questions.

Mr. FRELINGHUYSEN. Thank you, Mr. Secretary.

[The information follows:]

Statement of Secretary Steven Chu
U.S. Department of Energy
Before the
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives

FY 2013 Budget Hearing
February 28, 2012

Chairman Frelinghuysen, Ranking Member Visclosky and Members of the Committee, thank you for the opportunity to appear before you today to discuss the President's Fiscal Year 2013 Budget request for the Department of Energy.

To promote economic growth and strengthen national security, President Obama has called for "an all-out, all-in, all-of-the-above strategy that develops every source of American energy – a strategy that is cleaner and cheaper and full of new jobs." The President wants to fuel our economy with domestic energy resources while increasing our ability to compete in the global clean energy race.

Although the United States has reclaimed the title of world leader in clean energy investments, we are at risk of falling behind again unless we make a sustained federal commitment to supporting our domestic clean energy economy. To compete globally, America has to do more than invent technologies, we also have to produce and sell them. Our country faces a stark choice: we can create jobs making and exporting the energy technologies of tomorrow or we can cede leadership to other countries that are investing in these industries. As President Obama re-iterated in his State of the Union address, passing a Clean Energy Standard is a vital step that Congress can take to broaden our clean energy market and promote U.S. leadership.

Making the most of America's energy resources is a pillar of the President's economic blueprint to build an economy that lasts. The Energy Department also supports other key elements of the President's agenda including leading in innovation, reducing our dependence on oil, cutting costs for families, businesses and manufacturers through energy efficiency and reducing nuclear dangers worldwide.

Guided by the President's vision, the Department's 2011 Strategic Plan and our inaugural Quadrennial Technology Review, our FY13 budget request of $27.2 billion invests in the following priorities:

- Accelerating the transformation of America's energy system, and securing U.S. leadership in clean energy technologies;
- Investing in science and innovation to promote our nation's economic prosperity; and

- Keeping Americans safe by enhancing nuclear security through defense, nonproliferation and environmental cleanup.

These priorities will be enabled through a continuing commitment to fiscal responsibility and management excellence.

Leading in the Energy Technologies of the 21st century

Last year, a record $260 billion was invested globally in clean energy, and trillions of dollars will be invested in the coming decades. To seize this market and job creation opportunity, the President's budget request invests in programs that advance research, development, manufacturing and deployment of the energy technologies of the future.

Decades ago, support from the Energy Department helped to develop the technologies that have allowed us to tap into America's abundant shale gas resources. Today, our investments can help us advance technologies that will unlock the promise of renewable energy and energy efficiency.

The budget request invests approximately $4 billion in our energy programs. It supports the Department's SunShot initiative to make solar energy cost-competitive with any other form of electrical energy, without subsidy, by the end of the decade. It advances technological progress in areas ranging from offshore wind to carbon capture, utilization and storage to smart grid and energy storage. And it helps reduce our dependence on oil by developing the next generation of biofuels and accelerating research in advanced batteries and fuel-efficient vehicle technologies.

Leadership in nuclear energy technologies is also essential to our ability to compete globally. The budget request invests $770 million in the nuclear energy program to help develop the next-generation of nuclear power technologies, including small modular reactors. It also includes funding for continued R&D on the storage, transportation and disposal of nuclear waste, which also aligns with the recommendations of the Blue Ribbon Commission on America's Nuclear Future.

As we move to a sustainable energy future, America's fossil energy resources will continue to play an important role in our energy mix. President Obama is committed to developing our oil and gas resources in a safe and sustainable manner. Last year, our oil import dependence was at its lowest level in 16 years, oil production reached its highest level in eight years and natural gas production set a new record. Building on this progress, the Energy Department's budget request includes $12 million as part of a $45 million priority research and development initiative by the Departments of Energy, the Interior, and the Environmental Protection Agency to understand and minimize the potential environmental, health and safety impacts of natural gas development through hydraulic fracturing (fracking).

The budget request also promotes energy efficiency to create jobs and to help Americans save money by saving energy. It supports home weatherization and calls for passage of the HOME STAR program to provide incentives to homeowners to make energy efficiency upgrades. It also invests in research and development to improve building efficiency and supports the President's "Better Buildings" Initiative to catalyze private sector investment in commercial building efficiency. Finally, the budget request sponsors R&D on industrial materials and processes to help U.S. manufacturers cut costs and improve their global competitiveness.

To maximize our energy technology efforts, the Department is breaking down silos and coordinating research and development across our program offices. Modeled after our SunShot initiative, we're bringing together our basic and applied research programs and ARPA-E to harmonize their work in areas including batteries, biofuels and electric grid technologies.

And to encourage manufacturing and deployment of clean energy technologies, the President has called for renewing and extending proven tax incentives including the Production Tax Credit, the 1603 cash payment in lieu of tax credit program and the Advanced Energy Manufacturing Tax Credit, known as 48C.

As industry, Congress and the American people make critical energy decisions and require greater understanding of domestic and international energy markets, it's important that we adequately fund the Energy Information Administration, the nation's premier source of independent statistical information about energy production and use. That is why the budget request includes $116 million for EIA.

Unleashing U.S. Innovation to Create Jobs and Lead in the Global Economy

Competing in the new energy economy will require our country to harness all of our resources, including as the President said, the "one critical, renewable resource that the rest of the world can't match: American ingenuity." A key part of our country's success has been our leadership in science and technology, but we can't take that leadership for granted. According to the National Science Foundation's *2010 Science and Engineering Indicators* report, from 1996 to 2007, the average annual growth of R&D expenditures in the United States was about five to six percent compared to more than 20 percent in China.

To help keep the United States at the forefront of science and technology, the budget request invests in cutting-edge research that could spur new jobs and industries. This includes $5 billion for the Office of Science to support basic research that could lead to new discoveries and help solve our energy challenges. These funds support progress in materials science, basic energy science, advanced computing and more. They also provide America's researchers and industries with state-of-the-art tools to help take their work to the next level.

The budget request continues to support Energy Frontier Research Centers. The Energy Frontier Research Centers are working to solve specific scientific problems to unlock new clean energy development. So far, the EFRCs have published more than 1,000 peer-reviewed papers and filed more than 90 patent applications or patent/invention disclosures. Researchers are reporting multiple breakthroughs in areas ranging from advanced battery technology and solar energy to solid-state lighting and nuclear power.

The budget request also supports the five existing Energy Innovation Hubs and proposes a new Hub in electricity systems. Through the Hubs, we are bringing together our nation's top scientists and engineers to achieve game-changing energy goals. The Hubs continue to make progress. For example, the Modeling and Simulation for Nuclear Reactors Hub has released the first versions of its software that, upon completion, will simulate a virtual model of an operating physical reactor. The Fuels from Sunlight Hub has filed multiple invention disclosures and published scientific papers. And the Energy Efficient Building Systems Hub is developing advanced building modeling tools and has built one of the country's first 3-D building design labs.

Additionally, the budget request includes $350 million for the Advanced Research Projects Agency for Energy, known as ARPA-E, to support research projects that could fundamentally transform the ways we use and produce energy. ARPA-E has invested in roughly 180 high-risk, high-reward research projects that, if successful, could create the foundation for entirely new industries. These companies and research teams are working toward a prototype of a battery that has double the energy density and one-third the cost of batteries in 2010, bacteria that use carbon dioxide and electricity to make fuel for cars, grid scale electricity storage and other potentially game-changing breakthroughs. Eleven projects that received $40 million from ARPA-E over the last two years have done such promising work that they have now received more than $200 million in combined private sector funding.

Taken together, our research initiatives will help rev up America's great innovation machine to accelerate energy breakthroughs.

Nuclear Safety and Security

In addition to strengthening our economy, the budget request also strengthens our security by providing $11.5 billion for the Department's National Nuclear Security Administration. NNSA plays a key role in achieving President Obama's nuclear security objectives.

As the United States begins the nuclear arms reduction required by the New START treaty, the science, technology and engineering capabilities within the nuclear security enterprise will become even more important to sustaining the U.S. nuclear deterrent. The budget request includes $7.6 billion for Weapons Activities, a five percent increase over the FY 2012 enacted levels. This increase provides a strong basis for transitioning to a smaller yet still safe, secure and effective nuclear stockpile. It also strengthens the science, technology and engineering base of our enterprise.

The budget request also includes $1.1 billion for the Naval Reactors program to ensure the safe and reliable operation of reactors in nuclear-powered submarines and aircraft carriers and to fulfill the Navy's requirements for new nuclear propulsion plants that meet current and future national defense requirements.

Additionally, the budget request supports NNSA's critical work to prevent nuclear terrorism – one of the most immediate and extreme threats to global security and of one

President Obama's top priorities. It includes $2.5 billion to implement key nuclear security, nonproliferation and arms control activities. It supports efforts to detect, secure and dispose of dangerous nuclear and radiological material around the world. And it will help the Department to fulfill its role in accomplishing the President's goal of securing all vulnerable nuclear materials worldwide in four years.

Finally, the budget request includes $5.7 billion for the Office of Environmental Management to continue progress cleaning up the nation's Cold War nuclear sites.

Fiscal Responsibility and Management Excellence

The Department of Energy's FY13 budget request makes strategic investments to promote our country's future prosperity and security. At the same time, we recognize the country's fiscal challenges and our responsibility to invest in much-needed programs while cutting back where we can. That is why the President's budget request eliminates $4 billion in inefficient and unnecessary fossil fuel subsidies.

Given the urgency of the challenges we face, the Department is committed to performing our work efficiently and effectively. We are streamlining our organization to improve performance and save taxpayer money. For example, the Department achieved approximately $330 million in strategic procurement savings in FY11. We are taking several other steps such as reducing the size of our vehicle fleet, cutting back travel costs and consolidating websites.

We are also breaking down barriers to make it easier for businesses to move technologies from our national labs to the marketplace, which can help the United States seize technological leadership and create jobs. For example, we've started a program which makes it easier, quicker and less costly for start-up companies to sign option agreements to license national lab technologies. And to make it easier to work with the labs, we've reduced the advanced payment requirement, and streamlined the Cooperative Research and Development Agreement contract and approval process.

Throughout American history, the federal government has played a critical role in supporting industries that are important to our prosperity and security, from aviation and agriculture to biotechnologies and computer technologies. We should continue to do so today to lead in the new clean energy economy. Countries in Europe, Asia and throughout the Western Hemisphere recognize the energy opportunity and are moving aggressively to lead. This is a race we can win, but we must act with fierce urgency.

Thank you, and now I am pleased to answer your questions.

Mr. FRELINGHUYSEN. Since I understand we have votes in the 4 o'clock time frame, we will try to stick to the 5-minute rule. And that is for the Members to be aware of.

Mr. Secretary, our committee has long supported—and this has been very bipartisan—the Department's efforts to keep the world's best science and engineering workforce here at home and to keep our position as the world's top innovator.

We also need to think one step further by making sure we don't just invent the newest technologies but that we then manufacture them in the United States. After all, devoting Federal funding to support a research team of 10 people at home just so a company can support 1,000 manufacturing jobs overseas truly misses the mark.

Mr. Secretary, beyond the advanced manufacturing program your budget proposes, how are you working—and this is very much in line with the ranking member's comments—to ensure that federally funded research and development conducted at American universities, our laboratories, and companies then leads to manufacturing and jobs here in these United States?

Secretary CHU. Well, Mr. Chairman, first, I couldn't agree with you more. I think that if we invest in research in American universities or national labs or companies, that we would like to not only see that research lead to discoveries, but that research lead to manufacturing in the United States, because that is where we will see our future prosperity.

The Department of Energy is working on this in a number of ways. First, when there are issues having to do with IP generated by the Department of Energy, we are looking at, if we support a startup company or research, what means we have at our disposal to make sure that it doesn't go to the highest bidder and just——

Mr. FRELINGHUYSEN. Well, what are those means?

Secretary CHU. Well, I will tell you one example. We supported some research done by a company, BP Solar, which was based in America, on improving the manufacturability of silicon to drive the cost down. It was actually a successful program, but BP Solar decided that, given what was happening in China, that they were going to get out of this business. And we were taking steps to make sure that that IP generated by American taxpayers would have controls, so that it doesn't migrate.

Mr. FRELINGHUYSEN. So it did migrate?

Secretary CHU. Well, it—no——

Mr. FRELINGHUYSEN. Well, what is the reference to China?

Secretary CHU. Well——

Mr. FRELINGHUYSEN. We know that China is aggressive in this area, but——

Secretary CHU. Right.

Mr. FRELINGHUYSEN [continuing]. If we made—and you gave this example yourself—if we made this substantial investment, what did we do to protect that intellectual property?

Secretary CHU. Well, what we do is we look at the legal means we have of making sure. If this intellectual property is, quote, then "sold" to somewhere else, the United States will look at what means we have. But——

Mr. FRELINGHUYSEN. Well, respectfully, the Department of Energy has been in business for quite a long time. You have been the Secretary for a couple of years. This isn't new news here.

We have the excellence represented by a lot of incredible talent at all our national laboratories, and they have been coming up with some pretty ingenious ideas. What is to prevent that ingenuity and innovation from being sucked out of some of our labs and finding ourselves confronting challenges based on the cheap labor and manufacturing base in places like India or China?

Secretary CHU. Well, Mr. Chairman, what has happened in the last 10, 15 years is a growing realization that we can't take the industrial side of what we do for granted, but also an appreciation of how important it is that we remain a technology leader, especially in high-tech manufacturing that rests on the intellectual property that we generate here in the United States.

Mr. FRELINGHUYSEN. You headed up one of those laboratories.

Secretary CHU. Correct.

Mr. FRELINGHUYSEN. And God bless you for doing that. And the investments we made in the variety of innovators and people under your area of responsibility, well, what prevented that information from migrating abroad?

Secretary CHU. Well, first——

Mr. FRELINGHUYSEN. And what steps could we legally take if, indeed, it is possible in a global economy with the Internet——

Secretary CHU. When we support the development of an idea, we can, in principle, look at steps, and we are doing this increasingly. We have the ideas first. We are greasing the interaction between the private sector in the United States and what comes out of the universities and national laboratories.

In addition to that, if you support this research with U.S. taxpayer money, how do you begin to say, all right, we don't want to see this then go to the highest bidder? These are complex things that we are looking at, and it——

Mr. FRELINGHUYSEN. Well, we shouldn't be looking at it. How about, how are you acting on it? I mean, are the horses already out of the barn here? Have we come up with a lot of ingenious ideas and innovations and patents and are they being marketed by our global competitors?

Secretary CHU. Well, the U.S. Government doesn't have complete control over certain things. And so when a company, let's say a startup company, picks up an intellectual property and develops it, depending on what that company——

Mr. FRELINGHUYSEN. We just don't want them setting up shop outside Beijing, I mean, especially if we, as the taxpayers, have made these types of investments.

Secretary CHU. Right. So, it is a set of reasons to encourage American companies to set up manufacturing in the United States. That set of reasons includes provisions on whether they can use research supported by the Department of Energy, but they also include issues having to do with the climate in the United States, the fiscal policies and the tax policies.

Mr. FRELINGHUYSEN. We know the climate here, and it is not enuring to our benefit at the moment.

So let me yield to the ranking member, who through his, I think, opening statement shares very much my concern here. I mean, he can speak from an industrial base that has been stripped of a lot of its assets.

Mr. Visclosky.

Mr. VISCLOSKY. Thank you, Mr. Chairman.

Secretary, I have a couple of questions, and we have 5 minutes, at least on this first round. I would associate myself with the chairman and am very concerned.

We had the buy-American provision for the stimulus bill in 2009, but it applied only to infrastructure investment. And when credits were used for energy programs, much of those facilities and products were imported. I am told we have already lost tier-one production facilities and possibilities for solar. I produce more steel—I don't, my workers do—in my district than any State in the country. And every time I see a 250-ton windmill imported because we don't make it here, I get furious.

I appreciate that the last time we had a discussion, you initiated the conversation that there is a focus now at the Department about making sure that the intellectual firepower that you have is going to be used with a goal of making sure goods and products are manufactured. I do appreciate that.

The question I have on manufacturing, just to follow up, though, is, there is a proposal for a manufacturing demonstration facility within the 2013 budget. And, again, on first blush, I think that is a swell idea.

The concern I have is, over about the last 3 to 5 years, the Department has established the Bioenergy Research Center, Energy Innovation Hubs, the Energy Frontier Research Centers, Industrial Assessment Centers, Clean Energy Regional Application Centers, and manufacturing energy centers. And the obvious question is, do we need that? Do we have too many centers? Are we dissipating our efforts?

Secretary CHU. No, I don't think we are dissipating our efforts.

First, you have named a lot of centers, so let me start with the bioenergy centers that were started——

Mr. VISCLOSKY. I don't want—I am just saying, why do we need the manufacturing demonstration?

Secretary CHU. Okay. Fair question.

Mr. VISCLOSKY. Because, again, I have about 3 minutes left here.

Secretary CHU. Let me focus on that.

Those centers specifically are centers in which you work with American companies and they are almost like incubator companies—I have toured one, it was a carbon composite, it was done in conjunction with Oak Ridge—where you have companies and you test new manufacturing methods. So these companies say, "well, we don't really know whether this is going to work or not." So, you have a facility that helps them develop new manufacturing methods that can enable them to produce carbon composite materials, which virtually the whole world thinks will be a material of the future, cost-effectively, so that you can actually embody them in American products.

These are American companies that use this facility and say, look, we are going to do some experiments. Maybe these companies can't afford some of this stuff, but here is a facility. It is like an incubator house. Come and we will help you get started.

Those are examples of the manufacturing facilities which I think are directly applicable to help keep manufacturing in the United States.

Mr. VISCLOSKY. Okay.

Two last questions. The second one deals with the issue of management. And I would note that in the 2011 report by the GAO they did indicate that the Department has made progress toward many of the recommendations relative to the watchlist, but also suggested that DOE needs to commit sufficient people and resources to resolve its contract management problems. You still have, obviously, NNSA as well as environmental cleanup, which is about 60 percent of your budget, on the list.

Further, very recently, the National Academy of Sciences issued a report that talked about how serious management issues are hampering the work at NNSA, a weapons laboratory, noting persistent levels of mistrust, calling the relationship "dysfunctional."

What additional actions are you taking relative to the National Academy's report and that just persistent year-in and year-out appearance of DOE on that watchlist?

Secretary CHU. Well, with regard to the watchlist, as you noted, the Office of Science is now off the watchlist. And if you look at their recent record, it is 100 percent on time, on budget. That is existing proof in the Department of Energy that one can develop very complex multibillion-dollar budgets and carry them through in projects. I knew that when I walked in the door. It was a concerted effort to export those best practices in the Office of Science to NNSA and to environmental cleanup.

Let me very, very briefly say that a strong common denominator, especially in complex projects, for example, what the NNSA or WTP are doing, is you don't start construction until a large fraction of the engineering drawings are done. If you start putting shovels in the ground when you have 10 percent of the design done, you will invariably find out—this is not only true in government projects; this is true in the private sector, as well—you invariably find out that, oops, you should have done more design before you actually started the construction.

So a lot of the things that you see have been things put in progress years ago. There is now a concerted effort to make sure that you progress further along at, first, budget estimates, but also be very reluctant to start putting shovels in the ground until you know what you are going to be building.

Mr. VISCLOSKY. All right. In light of that National Academy report, I would ask that you just really——

Secretary CHU. Right. I would love to tell you about that, but another day.

Mr. VISCLOSKY. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Visclosky.

The big chairman, Mr. Rogers.

Mr. ROGERS. Thank you, Mr. Chairman.

Coal provides roughly 50 percent of the Nation's electricity today. If we went completely at 100 miles an hour developing other sources, you are still going to need coal for the foreseeable future.

It is an abundant resource that we have; we are called the Saudi Arabia of coal. It is inexpensive, relatively speaking, on the world market for energy.

And yet it seems this administration is intent on completely shutting off the use of coal and the mining of coal for the purpose of generating electricity. The EPA is issuing regulations almost every day. And with the most recent MATS, the mercury and air toxics standards rule that they issued, there is no technology capable of meeting those standards. And so, consequently, there can be no new coal plants because of that rule, among others.

And at the same time that EPA is demanding new technologies for compliance with their regulations, you are cutting the research that would develop those technologies. That seems to me to be incomprehensible. We have two agencies of the government at cross-purposes.

The Fossil Energy Research and Development Program in your department has played an important role in improving existing technologies and inventing entirely new ones. Your request for funding for fossil energy R&D is cut by 21 percent, a $113 million cut. The request cuts advanced energy systems by $45 million; that is almost half. And it cuts cross-cutting research by $19 million, which is 40 percent.

In essence, on the one hand the EPA is saying, "You can't build a new plant because you don't have the technology to burn coal the way we want it burned," and you are saying, "But I am not going to give you the money to find those ways to burn coal the way you would like."

Help me out here. Am I confused?

Secretary CHU. Well, Mr. Congressman, I have to say that I am very supportive of developing those technologies that you speak of to be able to use gas and coal in a clean way. We believe that it is very important to develop those technologies not only in the United States but in partnership with the world. Coal will be around for a long time, and we recognize that. I think Congressman Womack was at this ARPA–E summit and he heard me speak about that this morning, how important it is that we continue that research.

Part of the issue in the budget was that there was a lot of money rescinded in some of the carbon capture and sequestration projects that were a partnership between the government and the private sector. What we are trying to do, our viable path forward is that there is a beneficial use of carbon dioxide which will further our research in capturing carbon dioxide to be used to enhance oil recovery, but also, as we pump the carbon dioxide in the ground, we will learn a lot about what is going on.

What we say is, "All right, we understand. We are still interested in that." And so we are trying to work with industry and reprogram some of this. We have interest in having the carbon capture, and the sequestration part is now enhanced oil recovery, which will tell us a lot, and it will help sequester in the short term, meaning the 5 or 10 years. We are going to learn a lot from that.

Mr. ROGERS. But you cut the funding. You are proposing to cut the funding. You are going to cut fossil energy research and development by 21 percent. You are cutting advanced energy systems almost half, cross-cutting research by 40 percent.

Secretary CHU. Uh-huh.

Mr. ROGERS. All the while, you are increasing funding for all the other research programs other than for coal. Notably, a $500 million increase for the renewable program, which is already funded at $1.8 billion.

How do you explain that? That is completely contrary to the answer you just gave me, if I understood you correctly.

Secretary CHU. Well, as I said, we do support the research. There is a——

Mr. ROGERS. Then why are you cutting it? Drastically cutting it. That is a funny way of supporting it. How are you supporting it other than with money?

Secretary CHU. We are supporting it with money. We are supporting it with trying to work with the utility companies on these projects.

Mr. ROGERS. Well, there have been lots of applications for fossil energy R&D. I don't think any of them have been approved.

Secretary CHU. R&D? Excuse me? No, loan guarantees.

Mr. ROGERS. Loan guarantees. I am sorry.

Secretary CHU. Yeah. I think the loan guarantees are ones we are working through. These are very complex issues. We have the loan money. We are working through that. And these are complex issues. And I would like to see that loan money used.

Mr. FRELINGHUYSEN. I would like to go to Norm. Is that all right?

Mr. ROGERS. Yeah.

Mr. FRELINGHUYSEN. Mr. Dicks, the ranking member.

Mr. DICKS. Can you bring us up to date on Yucca Mountain?

Secretary CHU. As far as I know, what is happening is that this is before the courts and we are awaiting the decision of the courts.

Mr. DICKS. We understand that if, in fact, the courts rule—and we believe that this still is the law of the land—that you have to start forward. How much would you estimate it would cost to get this project back up, you know, moving forward?

Secretary CHU. I would have to get back to you on that. But certainly if the court's order is to proceed, we will proceed. I can get back to you on the exact details of how much——

Mr. DICKS. We understand it is around $100 million to get started.

Now, tell us about your blue-ribbon commission. What recommendations did they have on nuclear waste?

Secretary CHU. Well, what they recommended is, first, they, as we all do, acknowledge that we have to solve this problem, and it is very important that we do solve the problem.

They spent about 2 years, many, many meetings, very thorough job, and I commend them for the excellent job. But one of the things they noted was that other countries have done it in a different way, notably Sweden. They think also Finland has gone a different way. And so what they have found was that——

Mr. DICKS. Can you tell us what those ways are?

Secretary CHU. Yes. Sweden set up a public-private type of company. It is hard to describe—maybe TVA is the closest thing to that, but it is not officially in, let's say, the Department of Energy. With this, they also noted, if you can convince the people that this can be done in a safe way, there are economic benefits. What could have been, let's pick you, and you like it or not, it is going there. It turned out to be three competitive bids for the right to put the spent fuel in these sites. So it was a competition that kind of went completely in reverse. In fact, the losers, the people who did not get the site picked, actually had some side benefits. But there was a serious competition to say, we see economic benefit, and if you do this in a safe way, you can control the downsides.

We actually have an example of that in the United States in the low radioactive waste in New Mexico called WIPP, in Carlsbad, where it has been operating for 11, 12 years, roughly that period of time. Great economic benefit, no accidents. It is being done in a very safe way, and it has been economic prosperity for that region.

Mr. DICKS. You know, in my hometown of Bremerton, Washington, we have a big shipyard, and nuclear-powered submarines come in. And the waste is taken off the submarines and sent over to Mr. Simpson's NREL in Idaho, and they are supposed to send it on to Yucca Mountain. There are agreements here. This got up to the top level of the Clinton—I guess it was the Clinton administration. And there is a time, I think it is in, like, 2025, this has to happen, or Idaho will no longer be obligated to receive this waste.

So this has implications. The fact that we are just, you know, letting this thing go on and on and on I think is a big mistake. And I was here, I voted for this, to do it at Yucca Mountain. And I think that is the law of the land. It hasn't been changed.

I can't believe the courts are going to sustain your position. So you better start looking at these—you had better start figuring out how you are going to get Yucca Mountain moving forward.

You just can't declare something at the executive branch that it is no longer the law. You have to come to Congress and get the law changed. That hasn't happened.

Secretary CHU. Well, that was another very important recommendation of the Blue Ribbon Commission, that it is really is up to Congress, if Congress wants to change the law, and we would be willing to work with Congress to do that.

We take the legal obligations very seriously. I think it is 2035 you have to get prepared, and by 2037 you have to begin shipping.

Mr. SIMPSON. By 2035 it has to be out of State.

Secretary CHU. Okay. So, yes, we know that those are very serious legal obligations.

Mr. DICKS. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Dicks.

Mr. Lewis.

Mr. LEWIS. Thank you very much, Mr. Chairman.

Dr. Chu, thank you very much for being with us. I can't help but scratch my head about the fact that we are able to acquire someone of your background and talent to serve in this capacity. To say the least, beyond the heat you will be taking from committees like this, your willingness to serve is very much appreciated by many of us.

Secretary CHU. Thank you.

Mr. LEWIS. Your background is well known, a Nobel Prize winner in the arena of physics. But beyond that—you are celebrating your anniversary—is another thing. Your bride, Dr. Jean Chu, holds a doctorate in philosophy, as I understand it, in physics from Oxford University. And above and beyond that, she served as chief of staff for two Stanford University presidents, as well as dean of admissions. My God, it would be interesting to hear what you guys talk about at night.

Secretary CHU. All I know for sure is she would not have admitted me.

Mr. LEWIS. I must say, your service is very much appreciated.

But beyond that, the panel probably doesn't realize this, but Yucca Mountain has for all these decades essentially been in my district. And it strikes me that unless we learn from this most recent history, we are bound to repeat the disaster that is Yucca Mountain.

I was fooling around with a figure earlier, thinking that we had spent something in the neighborhood of $9 billion in the Yucca Mountain catastrophe. It is closer to $14 billion, as staff tells me.

In connection with that, in the early days of Yucca, all the politicians, who want to solve this problem purportedly, were supportive of Yucca Mountain as the location, especially when it was producing jobs in the local economic community. And then you move forward, and, lo and behold, there is some controversy around this subject, and all of the politicians flee, in spite of the billions of dollars they signed on to earlier.

The concern that we have to have is that, first of all, we must solve this difficulty in an environment that is a political environment. And Lord knows if we are not careful about learning from the past, we are bound to repeat it. We will spend billions of dollars again for another location following Yucca Mountain, and, lo and behold, what will happen?

So one way or another, we have to think through the pure politics of this if we are going to make serious progress. And the Congress ought to be trying to help you work their way through that, and I can't say that we have done that very well up to this point.

Secretary CHU. Can I respond?

Mr. LEWIS. Sure. Please do.

Secretary CHU. First, thank you for your comments.

I agree with you. And one of the recommendations of the Blue Ribbon Commission is to set up this semi-autonomous arm, like a TVA, that says, get it out of the political arena, get it so that you can have very competent people. Take a very professional attitude: what will be in the best interest of the United States in solving this problem?

So that was certainly one of the recommendations. But right now, it is up to Congress to weigh these considerations and to decide. But that is one of the clear recommendations of the Blue Ribbon Commission.

Mr. LEWIS. Well, in the meantime, we are struggling with this reality. It was not that long ago that others in the arena where I serve, where Yucca Mountain is located, we all supported that this should go forward, it was a logical location. I mean, lo and behold, the next time you locate a facility, please don't locate it somewhere near the Speaker's district, because the problems there will be endless, as well.

So between here and there, I would hope that your policy people would work very closely with us to try to have us together, hand-in-hand, have an independent commission or otherwise not just work effectively but get results at the other end.

Thank you.

Mr. FRELINGHUYSEN. Thank you.

Mr. Fattah.

Mr. FATTAH. Thank you, Mr. Chairman.

And welcome, again, to the Secretary.

I wanted to go back to this question of technology transfer and jobs. I have visited many of the Federal labs including Fermi Lab and Argonne Lab. I think that the Department has done an extraordinary job, particularly with regards to the stewardship and modernization of the nation's nuclear weapons. And I know that the committee has done a lot to make sure that we have fully funded those efforts.

This issue about government-funded research is not limited to the Energy Department. NASA has got 17,000 patents. I mean, we could go through the list. I know that the White House has required all of the departments to work on this question of technology transfer and jobs, and that the Department of Energy is working hand-in-hand with the Commerce Department and the National Innovation Marketplace, to get American manufacturers a first run at many of these opportunities.

This is a serious issue. And as a scientist, you will appreciate that on the one hand scientists want to have broad interactions around inventions and new ideas and new approaches in the scientific community. However at the same time, we are in economic competition with other countries. Making all this information public, making it available, leads to our economic competitors getting opportunities to pick the fruit off of trees that we planted with American taxpayer dollars.

So I believe the issue here with regards to research that is taxpayer funded is that we want those jobs—the new widgets that are going to be made, we want them made here in America. So I have introduced legislation in this regard, H.R. 2015—it is called the American Discoveries and American Jobs Act—which would focus the country on this question.

Because one well-intentioned lab personnel told me directly, he has four patents, he tried to build these products here in America, but he got a much better offer somewhere else. All of the research was paid for by American taxpayer dollars, but those jobs are some other place.

And there is a lot that we need to work on in this regard, and I am a big proponent of research. I think our labs are a tremendous asset. I traveled with the chairman and Mike Simpson and others, and I was just amazed at the work that is being done by the thousands and thousands of Ph.D.s on behalf of the American people. But we want to make sure that the jobs that are created by this work—stay here. And I believe that there is a lot of work that we have to do within that context.

Congress has to be involved. If we are going to tax someone who is working every day in my district or someone else's district and invest those dollars in some very smart people who come up with new ideas that they eventually take out to the commercial market and as a result make a lot of money then we want to ensure that the jobs that emanate from this at least be somewhere in the domestic United States, so that the whole country benefits from this.

So whether it is MRIs or LASIK eye surgery or GPS, all of this is, at its base was government-funded research. And we have to figure out a way to make sure that the jobs that emanate from this research help us reinvigorate our manufacturing base.

So I would be interested in you taking a look at the legislation. It is not, obviously, cast in stone. It is probably not going to pass any time in the near future. But I do think we have to work together in this regard.

Mr. FRELINGHUYSEN. Thank you, Mr. Fattah.

Mr. Simpson, whose name was invoked a few minutes ago.

Mr. SIMPSON. And very well, I must——

Mr. FRELINGHUYSEN. Very well.

Mr. SIMPSON. I am glad to see somebody else brought up Yucca Mountain first. Actually, I am—well, I don't know that I am not going to bring it up.

A couple of quick questions. First of all, it is interesting that when you mention WIPP and the Carlsbad area and how that has created jobs and economic benefits—if you will remember back to the beginning of WIPP, Congress had to force WIPP on Carlsbad. It was not readily accepted by the people of New Mexico. We were sued several times and everything else. So sometimes these things have to get done one way or another, which has been the issue with Yucca Mountain, obviously.

Has the Department embraced the Blue Ribbon Commission's recommendations? And if so, will it require legislation to implement some of those provisions? And if so, will you present that to Congress or will it be done by administrative fiat, such as closing Yucca Mountain?

Secretary CHU. No, I think it is very clear that Congress will have to play a very key role if it wants to amend the Nuclear Waste Act. And that was very clearly stated in the Blue Ribbon Commission Report.

Mr. SIMPSON. It would take an amendment of the Nuclear Waste Policy Act?

Secretary CHU. It depends on what parts you are talking about. For example, one of the recommendations was that there are fees collected from the power generators; and those fees are a considerable amount of money, three-quarters of a billion dollars a year.

Mr. SIMPSON. Right.

Secretary CHU. And they recommended that some fraction of those fees start to go to this. If a semi-private organization is set up, that takes it away from yearly appropriations it puts it on a more professional basis. It can start with a small fraction, but let that begin, because those moneys were clearly collected for that reason.

Mr. SIMPSON. And it is recommended that that occur promptly, if I remember correctly.

Secretary CHU. Well, but that would require an act of Congress.

Mr. SIMPSON. Have you proposed it?

Secretary CHU. We would love to work with Congress in deciding what Congress would be willing to accept on those things. That is one example.

Another example is the Blue Ribbon Commission points out that you would want both the permanent storage sites and you would want interim sites.

Mr. SIMPSON. Well, don't let this turn into a Simpson-Bowles, where we go out and we make all these recommendations and then nobody pushes it forward. If you are going to push it forward, then push it forward——

Secretary CHU. Right.

Mr. SIMPSON [continuing]. And come and work with Congress to get it done.

Secondly, along the lines of what Mr. Rogers was talking about, 50 percent of our electricity is produced by coal, 20 percent by nuclear power. When I look at your budget, I look at huge increases in the renewable energy, which is the very small part of the electrical portfolio, and cuts in the other area that is producing most of the electricity.

And I am, frankly, disappointed that we are seeing reductions in small modular reactors. This was the new road we were going to head down, but we are seeing reductions in that arena.

So it seems to me like there is an agenda of trying to push the green technology, when, in fact, nuclear energy I think is green technology. It doesn't put green house gasses in the air. And if you are really going to address global climate change, you had better adopt nuclear energy. And it doesn't seem like we are doing that in this budget. This is the first time I have seen a retrenchment in this administration in advancing nuclear energy. The talk is all there, but the budget doesn't reflect it.

Secretary CHU. Well, I think you know very well my support of nuclear energy and my support of clean coal. So we are trying to push what we can where we can do this. I think in this century those things will play an important part of our energy mix.

Mr. SIMPSON. Yes, they will play an important part.

One other question. You recently testified that you intend to separate civilian and defense nuclear fuel issues. Do you believe that you have the legal authority to do that under the Nuclear Waste Policy Act, to overturn a previous Presidential determination of how to handle these materials together? Frankly, I don't want to see defense nuclear waste be an orphan left at places that it currently is.

Secretary CHU. No, I agree. I mean, we——

Mr. SIMPSON. How do you plan to handle them differently?

Secretary CHU. Well, they are different, number one. And we have a responsibility for both of those in the U.S. Government, writ large, has a responsibility to handle both of those waste streams.

They are different; if nuclear power is going to be part of our energy mix in this century, it requires considerably more attention. But that is not to say that the other is not important.

Mr. FRELINGHUYSEN. Thank you, Mr. Simpson.

Mr. Olver.

Mr. OLVER. Thank you, Mr. Chairman.

Thank you, Mr. Secretary, for being here today. It may surprise you, but I think you have actually put forward a fairly reasonable and responsible budget. I wanted to just clarify a few things.

You referenced in your written testimony that the R&D that we do is 5 or 6 percent and that of China is something like 20 percent. China is, of course, a very swiftly emerging economy—growing and emerging economy. And the other two largest, Japan and Germany I guess would be the third and fourth largest economies after China and the U.S. What are the R&D budgets that they put forward?

Secretary CHU. Well, you know, off the top of my head, I can't really say exactly how the R&D budgets breakdown, but I can say that China especially has a very strong commitment to those industries which China deems will be an important part of their economic prosperity in the future.

And for that reason, that is why they are investing in many—they want to diversify from coal. They are heavily dependent on coal, but they are investing in nuclear reactors. They are going to be the biggest deployer of wind and solar in the world in their country, but they also view that as something for export, as well.

Mr. OLVER. Okay. Well, I was just hoping that I could get a sense whether or not other really mature economies, like Germany and France, were doing numbers much more similar to us. Because I think all of the really fast emerging economies would be doing more R&D than we would be doing. But I will leave that. We can discuss it at another point.

Some of our R&D major activities have been the Engineering Frontier Research Centers. I guess we now have 46 of those. Those have been standing for a couple of years now. Do you have an ongoing program for oversight or for measuring what the output of those centers is——

Secretary CHU. Yes.

Mr. OLVER [continuing]. At this point, or——

Secretary CHU. Yes.

Mr. OLVER [continuing]. Is it far too early?

Secretary CHU. We are starting a very thorough review of the effectiveness of those EFRCs and have very rigorous policies on how to evaluate them, based on outside scientific referees, to see how each one is doing. The ones that are working very effectively we would like to continue. The ones that are not, we are going to have some discussions——

Mr. OLVER. What is a fair period of time to begin to account?

Secretary CHU. Well, every year they are reviewed. But I think this next review is a much more thorough review, and so then you step back and look over the next couple of years. But every year——

Mr. OLVER. If they were established in 2009, they could not have been functioning effectively, if at all, until probably late 2010, in any case.

Secretary CHU. Well, that is right. So we are about 2 years into this. I think some of the EFRCs started in middle 2008. I am not actually sure of the exact dates, but let's say 2009, 2010.

Mr. OLVER. Are the hubs also standing at about the same time, or are they more recent?

Secretary CHU. Well, they are more recent, except for the three hubs which are the energy biocenters—they got started in the last administration. Those were actually the prototypes of what we had but expanding beyond——

Mr. OLVER. Those were for the energy research centers? Frontier research centers?

Secretary CHU. I am thinking 2006 or 2007. About the same time roughly, maybe a little earlier. The bioresearch centers—again, I can get back to you on the details—may have come a year or 2 earlier than the EFRCs and the energy hubs.

Mr. OLVER. Okay. You are asking for an additional hub. There are five up and standing, and you are asking for a sixth one. And in your testimony you said "electricity systems." Can you tell me what you mean by "electricity systems"?

Secretary CHU. Well, if you look at the electricity system in the United States, it is a very complex organism, if you will. And——

Mr. OLVER. Is this the delivery system?

Secretary CHU. It is the transmission and distribution system.

Mr. OLVER. The grid?

Secretary CHU. It is the delivery system, it is to control the flows of electricity. As you work to go to a modern grid that controls how you flow the electricity, you want to look at where there are potential vulnerabilities in the grid.

Mr. OLVER. Would that hub be responsible for trying to figure out how to reduce greatly the loss of power over distance? The delivery of power in a much more efficient manner?

Secretary CHU. That wouldn't be the——

Mr. FRELINGHUYSEN. Mr. Secretary, if you could maybe summarize in response to that question. I want to get everybody in here before we blow the whistle for votes.

Secretary CHU. Okay.

I will give you the details, but that is not the central focus. It is not over long distances. It is more distribution and control systems.

Mr. FRELINGHUYSEN. Thank you, Mr. Olver.

Mr. Rodney Alexander.

Mr. ALEXANDER. Thank you.

Mr. Secretary, the President's budget includes an interagency study that says that the Department of Energy, EPA, and USGS are partnering to study the environmental and health effects of hydraulic fracturing. Can you tell us a little bit about what that might lead us to?

Secretary CHU. Well, as you know, the President tasked us to set up a subcommittee to look at hydraulic fracturing. I think the conclusions of that subcommittee report were that we believe that hydraulic fracturing can be done in an environmentally responsible way so that you can take advantage of this great resource, and, it creates jobs. We think that gas is a very important fuel mix and a transition that we will be needing in this century.

And so, what we fully believe we have in the Department of Energy—and it is also aligned very closely with the expertise in USGS—is we have a lot of expertise in how fluids move in rock and how do you develop the technologies so that we can help industry know what is happening and develop this resource in an environmentally responsible way.

Mr. ALEXANDER. Well, how much time are we talking? The President in his State of the Union Address said that the government has been investing in shale energy extraction research for over 30 years. So how much more do we need to study it to determine——

Secretary CHU. Well, what the President was referring to in that case was, from 1978 until 1992, the Department of Energy invested in horizontal drilling and hydraulic fracturing at a time when industry wasn't really interested in it. And when industry began to pick it up in a real way, the U.S. Government got out of it.

Now, since that time it has been a story in which the development of shale gas and shale oil has been quite remarkable in the last half-dozen years. But there also are active environmental concerns. There are reports on fugitive emissions, things of that nature.

So the research we now want to do in the Department of Energy and the USGS is, all right, first, what is really happening? And, secondly, how do you keep on advancing best practices? Because we improve on virtually everything we do going forward. And, as I said, how could our research help in developing and improving the practices that are more focused on making sure that the water tables aren't contaminated, things of that nature.

Mr. ALEXANDER. Is the administration looking for a reason to shut down fracturing?

Secretary CHU. No.

Mr. ALEXANDER. Okay. Thank you.

Mr. FRELINGHUYSEN. Thank you, Mr. Alexander.

Mr. Womack, thanks for your patience down there.

Mr. WOMACK. Thank you.

And happy birthday, happy anniversary. And my compliments to the Secretary for his comments this morning at the ARPA–E energy summit. I found your comments to be enlightening. And a well-attended event, by the way. And my compliments to Arun Mujumdar, who was hosting the event.

I want to stay on the natural gas subject for just a moment. I am troubled by the fact that, when you look at the budget numbers, a little over $2 billion in renewable energy requests, and if I am reading the numbers correctly, we are looking at just a few million dollars on the subject of natural gas. And as was indicated in that previous round of questioning, that money is dedicated, if I heard correctly, to determining whether or not—you have said it has promise, but to make sure that we are not doing something environmentally.

So can you help me? I know those numbers—that is a wide range. And the numbers from the information agencies suggest that natural gas use by 2035 will be equal to all the renewables put together. So those numbers just don't seem to match up to me. Help me out with that.

Secretary CHU. Sure.

Let's bring in all of energy, including our transportation energy, which is roughly 38 percent or so of our energy, and how much the United States spends on either oil created domestically, produced domestically, oil produced and imported, that is probably, my guess would be, something to the order of $700 billion, $800 billion a year.

And our energy budget is not commensurate to how much we spend on oil, because oil is a very mature technology. The budgets we would spend on oil would be having to do with helping improve safety and helping improve technologies with regard to, for example, deepwater drilling.

So one shouldn't really look at the budget in relation to what we are spending as a country, and this is how we try to make these decisions. We try to invest in areas which are younger, earlier technologies. We are investing, for example, a small amount of money but a very important amount of money in seeing whether methane hydrates can be developed, again, because industry hasn't really decided whether this is going to be something—it is exactly what the Department did in the late 1970s and 1980s.

So what we try to do is invest in things where we think the taxpayers have the most leverage and can push the technologies forward in these various areas.

Mr. WOMACK. All right.

Speaking of leveraging, we have kind of a chicken and an egg. And I want to go to natural gas as a mobility fuel now. And I have listened with a lot of interest to Mr. Fred Smith this morning, from FedEx, on the use of natural gas, in their fleet.

And in my district, with the Arkoma Basin, the Fayetteville shale, and with the gas plays that are happening throughout our country, there seems to be growing demand for compressed natural gas as a mobility fuel. However, chicken and egg, we don't have the infrastructure to support it.

So how is DOE involved in helping us get to the level where that readily available resource can be put to good use?

Secretary CHU. Right. Excellent question.

First, I agree completely with Fred Smith about his assessment of liquified natural gas and heavy trucking that is a significant part of our transportation energy use; it is 20 percent. A couple hundred filling stations on major interstates, you could offset a lot of that. We looked at the numbers. It looked very promising. Payback periods something on the order of 3, 4 years for an investment in a more expensive truck. The private sector is getting behind and investing hundreds of millions of dollars.

So heavy trucking, very few filling stations. We think this is a great way to diversify our energy supply. When you go to delivery vans and when you go to personal vehicles, different. Because you can't have selected every 200 miles on an interstate. You need a lot more.

So we think that compressed natural gas is the solution. However, we need better storage. You either have a very expensive tank at a very high pressure, a carbon fiber tank, or you have a very heavy tank, which is really not considered an option, like a scuba tank.

And so what we have looked at this and it is the best thing we feel the Department of Energy can do—and we are putting out this Funding Opportunity Announcement—is to do two types of research: one, to decrease the tank costs so it is not an additional one-quarter to one-third extra in the vehicle, so you can use compressed natural gas, which we have more readily available infrastructure. And the other is to actually look at research where you can have the gas absorbed in a material in the tank, so you have the same storage capacity——

Mr. FRELINGHUYSEN. I have to interrupt here. If you could just finish your sentence, and then we are going to move on to Mr. Nunnelee.

Secretary CHU. So, again, it is a technological solution. If we didn't do this, again, we would offload a lot more, and we would be very thrilled by that.

Mr. WOMACK. Thank you, Secretary.

Mr. FRELINGHUYSEN. Thank you, Mr. Womack.

Mr. Nunnelee, thank you for your patience at the end of the line here.

Mr. NUNNELEE. Thank you, Mr. Chairman.

Thank you, Mr. Secretary, for being here.

Before you were nominated, you were quoted as saying, quote, "Somehow we have to figure out how to boost the price of gasoline to the levels in Europe." I can't look at motivations, I have to look at results. And under this administration, the price of gasoline has doubled. While we are bumping $4 a gallon in north Mississippi, today the price of gasoline in Europe is about $8 a gallon.

And the people of north Mississippi can't be here, so I have to be here and be their voice for them. And I have to tell you that $8-a-gallon gasoline makes them afraid. It is a cruel tax on the people of north Mississippi as they try to go back and forth to work. It is a cloud hanging over economic development and job creation.

And it appears to me this administration continues to drag its feet on oil exploration, on fossil fuel development and recovery. How do you respond to that?

Secretary CHU. Well, I think absolutely we should be judged on what we are doing, and I should be judged on my track record from when I became Secretary of Energy. And when this administration started, we were in a free-fall in a recession, and the price had plunged from roughly $140 a barrel down to a little under about $40 a barrel.

We will do everything in our powers—and we agree that there is great suffering when the price of gasoline increases in the United States. We are very concerned about this.

As I have repeatedly said, in the Department of Energy what we are trying to do is diversify our energy supply of transportation so that we have cost-effective means. Natural gas is great, and so we are pushing on natural gas for transportation.

In electrification, in the battery research that we have been funding, we have had some pretty spectacular breakthroughs, one just announced yesterday that looks like it is going to at least decrease the cost of these batteries twofold and maybe more.

Biofuels is a very aggressive program, started in the previous administration but continuing, again, to diversify that supply of transportation fuel.

So these are the things we are doing. And we are very focused on that because we understand the economic impacts that it has on all Americans and our economy.

Mr. NUNNELEE. But is the overall goal to get our price——

Secretary CHU. No, the overall goal is to decrease our dependency on oil—to build and strengthen our economy and to decrease our dependency on oil.

For the first time, you know, in the last 8 years, through a lot of policies put in in this administration and in previous administrations, our oil production has increased for the first time. It is at its highest level in 8 years. The import fraction is the highest level in 16 years.

We think that if you consider all these policies, including energy efficiency, that we can go a long way to becoming less dependent on oil and diversifying our supply it will help the American economy and the American consumers.

Mr. NUNNELEE. Thank you.

Mr. FRELINGHUYSEN. Mr. Nunnelee, thank you for putting a very human face on what a lot of American families are feeling at the pump and with their own family budgets.

Mr. Visclosky.

Mr. VISCLOSKY. Mr. Chairman, thank you. I realize we are at the end. I just want to highlight three issues that questions will be submitted for the record, Mr. Chairman, that I have a particular interest in.

One is the issue of the safety culture at the waste treatment facility. There was a DOE Office of Health, Safety, and Security investigation last year and a report. Very concerned about that systemic problem that continues to persist, and I have an interest in that question.

Relative to USEC, I realize that there was an agreement between the Department and USEC of $44 million relative to tailings as well as, in return, enrichment services. The question in particular I have is, what happens with the cost to the government long-term for those tailings? I fear it will far exceed the $44 million. Do the taxpayers pick that up, or does USEC pick up that additional liability?

And the last question is, I realize that the administration is looking for transfer authority for $106 million. The question I would have is, where will the $106 million be transferred from, should the authority ever be granted?

And I appreciate the chairman's indulgence.

Mr. FRELINGHUYSEN. And let me say I associate my feelings with Mr. Visclosky. There are a number of outstanding questions which we will put into the record, not the least of which is you still have, I think, $550 million unobligated in terms of the 705 stimulus loan guarantee money. Yes, I believe that is the amount.

A lot of that money went out in the waning months of the program's authority, and you personally approved that. Can you give the committee some assurances that that money and the programs it went to had better oversight than perhaps some of the other programs that were initiated?

Secretary CHU. Well, how do you want me to——

Mr. FRELINGHUYSEN. How would you like to characterize there were some lessons learned.

Secretary CHU. Well, there are always lessons learned in life. And, certainly, as I noted in my Senate testimony, we are continuing to improve how we administer the loans. But I wouldn't characterize what happened at the end—we were very careful in how we assessed. And so I think you are talking about the conditional loans and that obligation.

Mr. FRELINGHUYSEN. Yes, and how are you monitoring.

Secretary CHU. Right. So what we have been doing since I think 2010, mid-2010, is setting up a different section within the loan program, but also with outside eyes, within Department of Energy to look for changes in anything that materially affect the company and the environment the company is in. Certainly, if you look at the loan agreements that we have, there are very careful milestones that the company has to meet before the next part is meted out.

But in addition to that, as noted in the Solyndra case, there was a very, very rapid change in the whole ecosystem of photovoltaics. The price dropped by roughly 80 percent in 3 years, to one-quarter to one-fifth of what the solar modules are doing. When that happens, the good news is there is very rapid technology development that was occurring during that time and will continue to develop. The bad news is that, you know, not all companies are survivable.

Mr. FRELINGHUYSEN. Are you laying blame for that disaster on things that occurred in China? How about oversight of——

Secretary CHU. I am saying that when prices vary that much in a commodity product, that a lot of companies can be swept up by that.

Mr. FRELINGHUYSEN. Well, that is all the more reason for government oversight, and——

Secretary CHU. Exactly. I agree with you.

Mr. FRELINGHUYSEN [continuing]. To the point of my question.

Secretary CHU. I agree completely with you.

Mr. FRELINGHUYSEN. So we will continue to monitor what was approved last year.

Secretary CHU. Right. And as the economics and the business changes, if there is effectively something like that happening, we have to be very, very conscious of that. And we monitor these things very, very closely. And so——

Mr. FRELINGHUYSEN. Well, we are counting on you. And, obviously, I think a lot of the public-confidence issues that I mentioned in my initial opening statement rest on the type of assurances you are giving us this afternoon.

This is your lucky day. This is your birthday and your wedding anniversary. And we have some votes, which means that we will not reconvene. But we have a lot of questions for the record, and we hope that we can get responses back in good order. We look forward to cooperation from your staff in that regard.

And I may say for the record, if Members have any additional questions, they have a requisite 24 hours to get them in to be submitted to the Department of Energy.

[The information follows:]

Mr. FRELINGHUYSEN. So, Mr. Secretary, on behalf of Mr. Visclosky and the committee, we thank you for your time and that of your staff this afternoon.

Secretary CHU. Thank you.

Mr. FRELINGHUYSEN. We stand adjourned.

QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on the 2013 Budget Request for the Department of Energy
Tuesday, February 28, 2012

SUPPORT FOR DOMESTIC JOBS AND MANUFACTURING

SUPPORT FOR DOMESTIC MANUFACTURING THROUGH EFFICIENCY

Subcommittee. U.S. manufacturing is an increasing topic of discussion in the press lately, though it is one that the Subcommittee has followed with interest for some time. The Department is proposing some new manufacturing initiatives this year. How is the Department proposing to work with American manufacturers, and what are you doing to ensure that the technology we develop resides in the US and is not simply used to increase efficiency in foreign manufacturing plants?

Secretary Chu. Building on the work of the President's Council of Advisors on Science and Technology (PCAST) and as part of the Administration's comprehensive effort to secure the future of the Nation's global competitiveness in advanced manufacturing, the Energy Department worked together with the Departments of Commerce and Defense to lead an interagency effort under the National Science and Technology Council's (NSTC) Committee on Technology to assess the patterns and trends in U.S. Advanced Manufacturing. Through this work, it became clear that the acceleration of innovation for advanced manufacturing requires bridging a number of gaps in the present U.S. innovation system, particularly the gap between R&D activities and the deployment of technological innovations in domestic manufacturing production. To guide the Federal government's efforts to address these gaps, the NSTC developed and made public the "National Strategic Plan for Advanced Manufacturing."

The strategic plan lays out a robust innovation policy that would help to close these gaps and address the full lifecycle of technology. It also calls for intensive engagement among stakeholders, including industry, labor, academia, and government at the national, state, and regional levels. Partnerships among diverse stakeholders, varying by location and objective, are a keystone of the strategy, and part of the requirements to support increased private sector investment in both manufacturing technology development and advanced manufacturing production capacity.

The Energy Department is helping to carry out this strategy by engaging industry, small business, universities, and other stakeholders to identify and invest in emerging technologies with the potential to create high-quality domestic manufacturing jobs and enhance the global competitiveness of the United States. Currently, through its Advanced Manufacturing Office (AMO) the Department is supporting the National Network for Manufacturing Innovation (NNMI) – a cornerstone of President Obama's "Advanced Manufacturing Initiative," a national initiative focused squarely on maintaining and growing American leadership in advanced manufacturing. NNMI is designed to help U.S.-based manufacturing to remain globally competitive by fostering cutting-edge technological advances, solving problems of interest to a wide range of manufacturing sectors. The NNMI also seeks to catalyze our companies, large and small, to work synergistically with one another and with academic and other partners to advance technological innovation at a pace much faster than any one company could on its own.

On August 16, 2012, the Department participated in a multi-agency launch of a new public-private institute for manufacturing innovation in Youngstown, Ohio as part of its ongoing efforts to help revitalize American manufacturing. This new partnership, the National Additive Manufacturing Innovation Institute (NAMII), was selected through a competitive process, led by the Department of Defense, and consists of a consortium, which includes manufacturing firms, universities, community colleges, and non-profit organizations from the Ohio-Pennsylvania-West Virginia 'Tech Belt.' Specifically, the NAMII will provide the innovation infrastructure needed to support new additive manufacturing technology and products in order to become a global center of excellence for additive manufacturing. This pilot institute will bridge the gap between basic research and product development for additive manufacturing, provide shared assets to help companies, particularly small manufacturers, access cutting-edge capabilities and equipment, and create an environment to educate and train workers in advanced additive manufacturing skills. Advances in this class of transformational technologies can help American manufacturers dramatically increase the energy efficiency of their operations and reduce costs.

In a related effort, the Department also recently invested in 13 projects across the country through its Innovative Manufacturing Initiative to advance transformational technologies and materials that can help American manufacturers dramatically increase the energy efficiency of their operations and reduce costs. These projects will develop cutting-edge manufacturing tools, techniques, and processes that will be able to save companies money by reducing the energy needed to power their facilities. Each project will advance technologies early enough in their development cycles to permit the full scope of their technical benefits to be shared across a broad cross-section of the domestic economy.

Solicitations through which the Department participates stakeholders in the private sector are all run through an open and competitive process that includes review criteria which require that awards be made to American companies. Also intrinsic to the review process is the opportunity for companies that are selected for an award to receive a patent waiver designed to encourage development of the proposed technology in the United States. However, part of the value realized from the Department's investments is determined by whether or not the resulting innovations/technologies can be successfully commercialized (for an American company), including the prospect of possible sales into foreign markets. This raises the possibility that technology developed through Department investments may eventually be used to increase efficiency in foreign manufacturing plants. However, the ability for American companies to market technologies both domestically and abroad expands the opportunity for them and the country to reap the benefits of increased sales and trade.

PROPOSED ADVANCED MANUFACTURING INITIATIVE

Subcommittee. Mr. Secretary, the single largest increase proposed in the Energy Programs is a $174 million increase for the Industry Technology Program, which you rename to the Advanced Manufacturing program. While we certainly support helping American manufacturing to compete globally, this Committee also must ensure that such large increases are warranted and extremely well planned.

Mr. Secretary, how much of this request is a name change to the Industrial Technology Program, and how much is a complete retooling of that program to focus on manufacturing?

Secretary Chu. With the program name change from Industrial Technologies Program (ITP) to Advanced Manufacturing Program ("the Program") comes a new Program focus on manufacturing, which builds upon the successful elements of ITP.

Research, development, and demonstration activities will leverage past ITP successes by continuing to fund projects that meet transformative performance target objectives and milestones. In addition, the Next Generation Materials and Next Generation Manufacturing Processes portfolios also allow for cross-cutting program activities that are driven by industry demand for broadly-applicable technologies rather than addressing the more discrete needs of pre-selected market sectors. The program has benefited from tremendous industry response to this approach following issuance of the broadly-focused Innovative Manufacturing Initiative (IMI) solicitation that forms the main portion of the Next Generation Materials and Next Generation Manufacturing Processes portfolios. In response to the IMI funding opportunity, the Program received over 1,400 initial Letters of Intent that requested over $4.6 billion for cost-shared partnerships. The broadly-focused structure of partnership vehicles like the IMI help ensure relevance to U.S. manufacturers while the selection of cross-cutting, transformative and broadly-applicable technology helps ensure that Program funding can lead to benefits across all of industry.

In addition, the Program will continue to support existing U.S. manufacturers through technology deployment efforts targeted to help them overcome specific barriers to adoption of energy efficient technologies and best practices as a path to strengthen their global competitiveness.

Successful programs with proven track records and strong industry impact like the Industrial Assessment Centers, Superior Energy Performance certification program, Regional Clean Energy Application Centers, and the Better Buildings, Better Plants Challenge and Program (an evolution of *Save Energy Now*), will continue to contribute to the office mission.

Subcommittee. This is the second year in a row the budget request has proposed to significantly change this program. Last year, the Department proposed to start the new "Next Generation Materials" and "Next Generation Manufacturing Processes" program. As part of that request, the Administration proposed to zero out the programs that reduce energy consumption in steel, aluminum, paper, and chemicals manufacturing. Now this year, the Administration proposes to change the entire program once again, to focus exclusively on reducing energy consumption in American manufacturing. While ensuring American manufacturing is competitive is an important goal, you can see why this may be greeted with concern. Can you explain the 180-degree change the Department has proposed twice in two years?

Secretary Chu. Programs in the FY13 budget continue to support the same Advanced Manufacturing Program ("the Program") mission set out in FY12, with only minor, evolutionary updates for FY13. Though the Program focus on "reducing energy consumption in American manufacturing" has now been emphasized as one critical component of the office mission, it does not represent the whole Program mission, nor does it signal a 180-degree change in this mission. Despite the reinvigorated effort to help strengthen the competitiveness of American manufacturing through innovative energy-efficient materials and processes, the mission of the Program has remained consistently focused on spurring a renaissance of American industry through research, development, demonstration and targeted technology deployment activities to new and existing facilities. The requested funding levels continue to signal the magnitude of investment required to meet this challenge.

The phasing out of programs that fund specific industrial sectors like steel, aluminum, paper, and chemicals manufacturing is a reflection of the more inclusive Program mission developed for FY12 and subsequently through FY13. This change in budget structure, however, does not reflect a de-prioritization of any particular sector. The roll-up of the Industrial Technologies Program's past R&D portfolios into two broad Next

Generation categories allows for more competitive, purposeful funding choices with large benefits to the nation. Firstly, it allows for industry-driven technology selection through broadly-focused solicitations like the Innovative Manufacturing Initiative (IMI). This approach helps ensure that the innovative technologies supported through the Program have a high relevance to industry and increase the chances for commercialization so that businesses can reap more benefits from their R&D successes.

Secondly, the cross-cutting approach provides a flexible framework for either: A) selecting technologies that may have widespread benefits across sectors, but less significant benefits in any particular sector, or B) prioritizing technologies that are highly relevant to a few specific sectors over those that are specific to only one. For instance, a breakthrough in aluminum processing is still highly relevant to the Next Generation Manufacturing Processes portfolio, but it will be of higher relevance to the Program if it also has potential application in steel and titanium.

Thirdly, the updated Program structure allows for more adaptable public-private partnership models like Manufacturing Demonstration Facilities (MDFs) that leverage regional strengths.

Subcommittee. When you say this program is going to help manufacturers reduce energy usage, it's useful to remember that manufacturing covers many, many industries. Which industries do you intent to focus on in fiscal year 2013 if this program is funded?

Secretary Chu. Building upon the programs initiated in FY12, the Advanced Manufacturing Program ("the Program") will continue to focus on supporting projects and programs that develop and demonstrate energy-efficient processes and materials that are transformative, pre-competitive, and broadly applicable to many industries. The Program will continue to advance these high-quality and cost-effective manufacturing technologies across a broad range of industries rather than attempting to single out particular industry sectors for discrete attention. The Innovative Manufacturing Initiative (IMI) is indicative of the Program's open and cross-cutting approach. The IMI will support competitively selected, industry-led cost-shared technology projects within broadly-applicable technology domains. For example, the IMI solicitation identifies new reaction and separation technologies with improved energy-efficiency and process intensification as one area of interest precisely because projects with this focus could have energy and cost savings applicable to a broad range of industries such as food processing and chemical production. Another example from the IMI that illustrates the Program's open approach is the solicitation's subtopic on projects that will develop advanced industrial materials that significantly improve performance of energy production and energy transfer equipment such as advanced composites, hybrid materials, engineered polymers, and low-density and relatively high-strength metals like magnesium and titanium or other materials as proposed by industry. Each of these project areas could impact a diverse range of industrial firms without excluding any particular sector.

PROPOSED NEW MANUFACTURING DEMONSTRATION FACILITIES

Subcommittee. The request for the new Advanced Manufacturing program proposes to create new Manufacturing Demonstration Facilities, which essentially provide publicly-funded facilities for manufacturers to test new manufacturing processes.

Can you explain why these centers are needed and worth the public investment?

Secretary Chu. DOE's Manufacturing Demonstration Facilities (MDFs) are being designed to create a collaborative environment and an infrastructure around targeted technical areas. These MDFs are expected to enhance opportunities for U.S. manufacturers to develop, use, and promote energy efficient, rapid, flexible manufacturing technologies. Emphasis will be placed on providing manufacturers and product developers with access to physical and virtual tools for prototyping new technologies and optimizing critical manufacturing processes. These shared tools will especially provide small- and medium-sized enterprises access to innovative tools and resources that would otherwise be cost-prohibitive for an individual company. MDFs could be housed in existing centers or operate as a virtual collective entity.

In June 2011, the Report to the President on Ensuring American Leadership in Advanced Manufacturing from the President's Council of Advisors on Science and Technology (PCAST) stated that manufacturing, as a share of our national income, has declined over the long term. The Report goes on to conclude that the U.S. can regain its leadership in advanced manufacturing by focusing on products and processes derived from scientific discovery and technological innovation. The Report reinforces this core recommendation by identifying several downstream benefits from this focus, including that 1) advanced manufacturing, based on new technologies including high-precision tools and advanced materials, provides opportunities for high-quality, good paying jobs for American workers; and 2) domestic manufacturing capabilities using advanced technologies and techniques are vital to our national security. The MDFs provide a framework through which both of these critical objectives will be pursued.

The importance of the MDFs stems from their ability to drive advances in both product and process technologies for the U.S. manufacturing sector. The MDFs will provide members of the manufacturing community access to unique research capabilities and a range of multi-user facilities on a timely and affordable basis while protecting intellectual property, to facilitate new applications and rapid dissemination of technology developments. These innovations are expected to help enhance the competitiveness of U.S. manufacturers and industries by reducing lifecycle energy use and greenhouse gas emissions, lowering production costs, and cultivating an advanced workforce.

Subcommittee. Is this based on a model you've seen work in other countries?

Secretary Chu. The Department of Energy (DOE) developed its model for the Manufacturing Demonstration Facilities (MDFs) based upon inquiries into existing research, development, and demonstration needs within the U.S. industry and manufacturing sectors. In developing the model for the MDFs, DOE did consider aspects of several other models of shared infrastructure facilities around manufacturing and related technologies from other countries. Two examples of such programs similar to the MDF concept are the German Fraunhofer Institutes and the U.K. High Value Manufacturing Catapult. The Fraunhofer Institutes have been in existence for over 60 years and are highly regarded examples of applied research supporting innovation for high value manufacturing.

The Fraunhofer Institutes have four manufacturing-specific institutes and several related institutes. One such related institute dealing with Advanced Materials – Bonding Technology and Surfaces focuses on the development and characterization of adhesives and matrix resins as well as joints. Work at the facility also focuses on automating industrial adhesive bonding applications, performing process reviews, and providing training courses in adhesive bonding technology and fiber composite materials. The U.K.'s High Value Manufacturing Catapult, launched in 2011, is comprised of seven centers of manufacturing, such as the National Composites Centre (NCC). The NCC focuses on the demonstration phase of development and also provides training on advanced composites. The type of work conducted through each of these two foreign initiatives and the value contributed by each parallel certain aspects of the function and intended contribution of the MDFs.

The first DOE MDF has been awarded to Oak Ridge National Laboratory (ORNL) and is focused on additive manufacturing, as well as low cost carbon fiber production domains. ORNL has established partnerships with 23 private entities in support of this MDF.

Subcommittee. The Department has proposed many different kinds of new research models and centers in the last three years — BioEnergy Research Centers, Energy Innovation Hubs under one roof, Hubs under 2 roofs, Hubs under 9 roofs, Energy Frontier Research Centers, Industrial Assessment Centers, Clean Energy Regional Application Centers, Manufacturing Energy Centers… And now this program proposes yet another one, Manufacturing Demonstration Facilities. You can understand why there might be some reluctance. Isn't funding yet another type of center a case of "too many, too quickly"?

Secretary Chu. The mission of the Advanced Manufacturing program ("the Program") is to research, develop, and demonstrate at a convincing, production-relevant scale energy-efficient manufacturing processes and technologies to reduce the energy intensity and life-cycle energy consumption of manufactured products, and to promote a corporate culture of continuous improvement in energy efficiency among existing facilities and manufacturers. Each of the centers and initiatives supported through the Program is tailored to address specific barriers faced by technology developers and manufacturers to ensure that cost-effective technologies are effectively transitioned from fundamental to applied research, developed into commercially available products, and widely deployed where they are demanded throughout U.S. supply chains. While the Program's current plan calls on it to support a number of different initiatives, as noted in the question, these efforts should all help to strengthen the competitiveness of U.S. manufacturers. Two of the examples provided above in the Program's portfolio, the Industrial Assessment Centers and the Clean Energy Regional Application Centers, have been in operation and achieving successful results for many years.

Industrial Assessment Centers are a network of university-based, DOE-supported programs that conduct energy audits for small and medium size manufacturers while simultaneously training engineering students to help them become the next generation of energy management professionals.

Clean Energy Application Centers provide technical information, perform market assessments and conduct education and outreach to industry stakeholders as a strategy to accelerate the adoption of clean energy technologies – principally combined heat and power (CHP) – helping manufacturers save energy and money.

Manufacturing Demonstration Facilities will help enable advanced manufacturing technologies to be developed and assessed by prototyping new technologies and optimizing critical manufacturing processes, with an emphasis on energy-efficient technologies and processes. MDFs are being designed to create a collaborative environment and an infrastructure around targeted technical areas. The fundamental aspect that makes the MDFs unique is the ability to make larger quantities of material or test a fully integrated process at large scale, which differs from the ability to make lab-scale quantities of a material or test an isolated step in a process. The MDFs will focus on the challenges that occur when scaling up technologies, thereby accelerating process and product innovation and providing innovators the ability to test different manufacturing methods using collaboratively developed, shared infrastructure.

Subcommittee. For how long are we committing public funding to these centers? Will Department funding be needed for one year? Five years? Indefinitely?

Secretary Chu. The Department of Energy plans to fund the new Manufacturing Demonstration Facilities for an initial five year period, during which time there will be an overall non-federal funding cost share requirement of fifty percent. All such MDFs will be fully funded up-front for the entire five year period out of available budget authority in the year of award.

PROJECTIONS FOR NATURAL GAS AND MANUFACTURING NEEDS

Subcommittee. The recent expansion in shale gas production is likely to make natural gas plants one of the largest areas of growth in our energy sector for decades to come. In fact, the Department's Energy Information Administration projects that, through 2035, domestic energy use from natural gas will grow by as much as all renewable energy source will grow. This means that for every billion dollars the U.S. economy spends on new solar panels or wind turbines, we'll spend just as much on natural gas turbines.

Within that reality, let's look at the budget request numbers. You ask for $2.3 billion for renewable energy and energy efficiency, more than $500 million above the current level. For natural gas, you ask for just $17 million in total, and most of that is to research environmental and health issues related to shale gas extraction — not for manufacturing improvements.

Secretary Chu, when manufacturing is said to be such a priority for the Administration, are you short-changing natural gas?

Secretary Chu. The focus of the Fossil Energy Research and Development (FE R&D) Program remains the minimization of environmental impacts from coal power plants, we are developing a range of technologies, in areas such as turbo-machinery and gas separation, which we feel will improve the prospects for the development of new gas-based manufacturing in the United States.

Subcommittee. With so little support proposed to help our industry stay competitive, how can we be sure that the natural gas turbines and equipment bought in the United States over the next 20 years won't be made in China? Don't we need to pay attention to that industry as well?

Secretary Chu. The advanced components being developed under Fossil Energy's Turbines Programs are proprietary technologies and are being developed by American-based suppliers, with manufacturing facilities in the United States. We conduct the FE R&D program in this fashion to maintain the U.S. suppliers' technical and competitive advantage.

In addition, there is a substantial and growing industry-led manufacturing capability in the United States, evidenced by companies like Siemens, that recently opened a new plant in Charlotte, NC, focused on manufacturing natural gas turbines.

COMPETITION FOR NUCLEAR ENERGY MANUFACTURING

Subcommittee. Secretary Chu, two weeks ago you spoke at the Vogtle Plant, the first nuclear plant to gain approval for construction in more than 30 years. In that speech, you note the importance of the U.S. maintaining a leading position in nuclear reactor manufacturing. I couldn't agree more, and I applaud you for the budget request's support for activities like the Small Modular Reactors program.

In that same speech, you point out that, "the work being done...at research organizations like Oak Ridge National Laboratory is helping restore American leadership in the global race for the nuclear energy jobs of tomorrow." I agree with this statement as well, and this Committee has provided strong funding support for the Nuclear Energy program to that end. And yet, the budget request for fiscal year 2013 reduces funding for Nuclear Energy research programs by $93 million — more than a 12 percent cut. It seems that you're publicly supporting nuclear power manufacturing but not following up with the budget at a time with many other nations are moving forward rapidly in nuclear sector.

How do you justify a cut to this program if you're serious about keeping the global lead in this industry?

Secretary Chu. As the President emphasized in his State of the Union Address, "this country needs an all-out, all-of-the-above strategy that develops every available source of American energy." Nuclear energy will continue to play an integral role in our nation's energy mix. Nuclear energy currently supplies over 70 percent of our nation's carbon-free electricity and NE will continue to explore the avenues that offer the highest probability of nuclear power fulfilling this role.

The President's fiscal year 2013 budget requests $770.4 million for the Office of Nuclear Energy.

REDUCED FUNDING FOR NUCLEAR MANUFACTURING

Subcommittee. Secretary Chu, as part of the budget request's reduction for Nuclear Energy funding, the Department proposes to reduce the research line entitled "Crosscutting Technology Development." This reduction in part, according to the budget request documents, "reflects no new investments in the areas of manufacturing methods… due to reprioritization."

Can you explain, Secretary Chu, why the Department has such as large budgetary thrust towards manufacturing, while it cuts manufacturing research in the Nuclear Energy account?

Secretary Chu. The Advanced Methods for Manufacturing (AMM) program is an important program that aligns with the President's economic efforts by providing research, development, and demonstration on innovative methods for the manufacturing of nuclear components and equipment. Projects will be initiated at the end of FY 2012 through a competitive process that will continue in FY2013 through end of FY2014. AMM also plans to issue a roadmap in FY 2012 to guide future solicited research and technology development in the event that funding can be found in future years.

Because of the ongoing projects, the Department decided to defer additional AMM projects in FY13 so that it could support other important areas within this account rather than spreading the budget reduction to the other subprograms that were already at minimum levels. The Nuclear Energy Advanced Modeling and Simulation, the Reactor Materials, and the Advanced Sensors and Instrumentation subprograms are priorities because they have the potential to make the greatest impacts in nuclear technology development, provide needed capabilities common across NE R&D programs, deliver enabling technologies beyond individual programs, create capabilities needed by the NE R&D enterprise, and undertake high risk research to overcome design limitations. Thus, the AMM subprogram was deferred to provide a stronger support to these priority programs.

Additionally, other agencies are promoting advanced manufacturing; for example, the National Institute of Standards and Technology is requesting funding in FY 2013 to help test and accelerate the development of new technologies created in the advanced manufacturing sector. NE will work with NIST and standards setting bodies to make sure implementing codes and standards are available to support new AMM technologies.

SHAKEOUT IN THE SOLAR PANEL MANUFACTURING INDUSTRY

Subcommittee. While the last several years brought a boom to the U.S. solar industry, we're in the midst of a substantial shakeout in the industry. Several companies — some that received considerable federal support — closed shop over the last year. Looking forward, a flood of low-cost solar panels from China are making it hard for our industry to compete. Simply put, we're being undercut.

How do we ensure that the solar programs proposed in the budget request are not simply inventing lower-cost methods that other nations may end up using to their advantage? How can these programs instead help our industry to compete and keep manufacturing here in the United States?

Secretary Chu. Historically, it has been the trend that many of the innovations in solar and in other technologies, such as semiconductor microelectronics, have been developed in the U.S. and then manufactured abroad to a significant degree. The Solar Program at DOE has done very well in terms of evolving patents and know-how from the research in a lab into the early stage of product development through a high successful incubator program. Many start-up companies, however, are leaving the shores of the U.S. after early product development to find cheap capital in other countries such as China for the purposes of larger scale manufacturing. As a result, DOE has developed what it is calling its SUNPATH program. SUNPATH, which stands for Scaling Up Nascent PV At Home, targets companies as they scale at the critical stage of 50-100MW, which is often when technologies go off-shore seeking cheap capital. In addition, programs such as the "48C" Manufacturing Tax Credit funded under the Recovery Act help incentivize U.S. manufacturing. Under this program, $2.3 billion was allocated for over 180 clean energy manufacturing facilities. The President's Budget for FY 2013 proposes an addition $5 billion in credits for the 48C Manufacturing Tax Credit program.

The Solar Program's SunShot Incubator has supported companies such as PrimeStar, which was recently acquired by General Electric. In fact, $60 million in federal funding for the Incubator program since 2007 has leveraged more than $1.6 billion in private funds. However, transitioning to a full-fledged product development company involves significant capital investment (in the case of solar manufacturing, it is approximately $1M/MW). Securing this investment has proven to be challenging within the US, in contrast to the willingness of some foreign government-backed financial institutions to shoulder the risk associated with scaling new technologies to manufacturing scale within their respective countries.

Subcommittee. Is there a next generation technology on the horizon that might enable the US to excel in solar manufacturing once more?

Secretary Chu. Yes, we are pushing hard into several thin film based technologies. The DOE SunShot Initiative is a collaborative national initiative to make solar energy cost competitive with other forms of energy by the end of the decade. One example of this is CdTe technology. Intellectual Property from DOE funded research on thin film CdTe solar cells at the National Renewable Energy Laboratory (NREL) was licensed in 2007 by Primestar, one of our SunShot Incubator awardees. They were subsequently bought out by General Electric, which is setting up a 300MW manufacturing facility in Colorado. This is an excellent example of federal R&D investment that evolved all the way from national lab R&D activity to a full scale technology transfer and product development within the U.S. Notwithstanding this success, we are not resting on our laurels; we are rapidly expanding our R&D activities in the CdTe space to explore pathways to get to 23-25% efficient cells, that will enable us to make a strong push to compete with Si solar cells. We are using similar approaches in the copper indium gallium selenide (CIGS) solar cell technology space as well. A second example of how SunShot is aggressively pursuing alternatives to standard Silicon solar technology is to explore concentrated PV approaches, with new and more aggressive technical and cost targets than explored in the past. One benefit of manufacturing concentrated PV (CPV) is that the U.S. is well suited for the deployment given our strong direct normal incidence solar resources, and CPV systems will typically be manufactured where it is deployed.

The low cost solar panels from China are almost exclusively made from either single crystalline or polycrystalline silicon. A significant amount of the intellectual property involving Silicon solar panels has been developed in the US but is now used in manufacturing outside the US. However, the US still has strength in the supply chain that enables the manufacturing of solar cells and modules. For example, companies such as Applied Materials, Dow, MEMC, REC, Hemlock, DuPont, and 3M export a significant amount of equipment and materials that support the global silicon industry. But domestic manufacturing of silicon cells and modules has proven much more difficult in light of intense competition from overseas, and the fact that the majority of modules today are deployed overseas.

PROGRAM MANAGEMENT

MANAGEMENT CHALLENGES AND GAO'S HIGH-RISK LIST

Subcommittee. Mr. Secretary, your agency has been challenged every year to improve its project management capabilities. But in 2011, the Department of Energy continued its annual appearance on the GAO high risk list. While the GAO has recognized that the Department has made progress toward many of the recommendations, they maintain that additional actions are needed. Specifically, DOE needs to commit sufficient people and resources to resolve its contract management problems, and DOE must monitor and independently validate the effectiveness and sustainability of these corrective measures. Two of the largest parts of the Department, Environmental Cleanup and the National Nuclear Security Administration, continue to be on high-risk list and ripe for waste, fraud, abuse, and mismanagement.

Since these programs make up more than 60 percent of your request, what, specifically, are you doing to address these remaining issues and will we see the Department on the upcoming high risk list for 2012?

Secretary Chu. The Department understands the principles fundamental to effective project management, to include leadership commitment, appropriate management and technical expertise, and disciplined and rigorous implementation of project management policies, and has adopted them and incorporated them into its policies, requirements and processes. The Department is confident it has turned the corner on its journey to improved contract and project management. These principles are being aggressively pursued by the Department to ensure project management requirements are consistently followed, oversight of contractors continues to improve, and accountability for performance is strengthened.

The major enhancements in DOE's project and contract management practices resulting from the Root Cause Analysis and Corrective Action Plan efforts include: improving front-end planning by requiring sufficient design maturity prior to establishing performance baselines; defining required project staff size and required skill set across the project lifecycle and enhancing training and qualifications of project and contract management personnel; stabilizing project funding and affordability by adhering to baseline funding profiles for incrementally funded projects in annual budget requests; strengthening DOE Order 413.3B inclusive of new independent cost estimating requirements at all Critical Decision gateways; deploying a new and more robust Project Assessment and Reporting System (PARS II) which allows for direct upload of contractor project performance data in order to eliminate errors and delays inherent in the original system and enhance data reliability; and implementing Project Peer Reviews, a best practice successfully employed by the Office of Science, across the Department to better monitor project development and execution and foster sharing of design, procurement and construction lessons learned.

Ultimately, the Department's effectiveness and success, resulting from teamwork, will be measured by the continued improvement of cost and schedule performance in delivery of its capital asset projects.

As of the end of FY 2011, the Department reported to both the Office of Management and Budget and the Government Accountability Office that it successfully completed 98% of its projects for which Performance Baselines (DOE's scope, cost and schedule commitments to Congress) were established subsequent to the start of the Root Cause Analysis and Corrective Action Plan efforts in FY 2007. The metric for project success is defined as: Complete projects within the ORIGINAL approved scope baseline, and within 110% of the ORIGINAL approved cost baseline at project completion, unless otherwise impacted by a directed change.

DYSFUNCTION BETWEEN LABS AND DOE MANAGEMENT

Subcommittee. Mr. Secretary, a recent National Academy of Sciences study panel said that "serious" management issues are hampering work at the NNSA weapons laboratories, noting a "persistent level of mistrust" between the labs and federal overseers and calling the relationship "dysfunctional" and "broken". What actions are you taking to address these concerns? If this is an issue at the weapons labs, do you believe it is of a concern at the other DOE sites?

Secretary Chu. The National Academy of Sciences (NAS) study suggests that some of NNSA's administrative oversight activities, as well as the existence of some decaying facilities at the weapons labs, has strained the relationship between the NNSA labs and the Department; it also concludes that more money would be available for the labs' scientific missions if the costs associated with excessive/unnecessary oversight activities were cut.

I have initiated DOE/NNSA-wide activities to enhance the relationship between the laboratories, sites, and headquarters, improve the way we do business, increase efficiency; and maintain safe, secure, and responsible operations at our sites. Here are some examples of recent/ongoing efforts aimed at reshaping our relationship:

- The National Laboratory Directors' Council (NLDC), a body comprised of the directors of the 17 DOE/NNSA laboratories and several of our specialized weapons production sites, and I hold at-least-monthly discussions on topics of interest and concern to the laboratories and the Department as a whole. Last year, we engaged in a notable exercise in which I asked the NLDC to identify for me a list of Departmental policies and practices that present opportunities for improvement in the way DOE does business. Of the 28 items identified by the Lab Directors in response to my request, 25 have been resolved, 2 are on hold at the request of the Directors, and one is still being worked.

- The Department's Directives Review Board, which includes NNSA, has put in place a more rigorous review process for requirements in existing and proposed DOE directives and technical standards. Specifically, the new review practice calls for requirements owners to provide risk-based justifications for requirements as well as an assessment of the cost and resource impacts of the requirements on Federal and contractor personnel, as appropriate.

- Within NNSA, the Enterprise Operating Requirements Review Board (EORRB) engages Lab and Plant Directors, Site Managers and Headquarters leadership to look at requirements and directives in order to 'right-size' them.

- The NNSA Administrator's NAP-21 "Transformational Governance and Oversight", issued last year defined principles, responsibilities, processes, and requirements to help in transforming and improving governance and oversight.

The NNSA Administrator has initiated monthly executive VTCs with the executive core from labs, plants, and headquarters, and has hosted two off-site retreats. Similarly, within the Office of Science, the Director has for many years hosted quarterly, day-long meetings with the 10 SC laboratory directors to discuss programmatic as well as operational issues of interest to both parties.

Administrator D'Agostino. The National Academy of Sciences (NAS) study suggests that some of NNSA's administrative oversight activities, as well as the existence of some decaying facilities at the weapons labs, has strained the relationship between the NNSA labs and the Department; it also concludes that more money would be available for the labs' scientific missions if the costs associated with excessive/unnecessary oversight activities were cut. We agree with the NAS study on these points, and I believe they are also true, although to a lesser extent, at the laboratories owned by the Office of Science (SC) and the applied energy programs. I also believe that activities we are undertaking to address the NAS findings in NNSA have the potential to result in best practices and reforms of relevance to the entire Department.

One of the key undertakings that NNSA is embarking on prioritizes balancing our Federal oversight responsibilities of safety, security, and business practices, with our goal to provide the contractors with operational flexibility and to minimize intrusive bureaucratic practices that inhibit such flexibility. This initiative is consistent with DOE's management model for all of its laboratories, which is based on the premise that the Government shall establish broad program objectives and goals for the labs, capitalize on the private sector expertise of our contractors, give the contractors sufficient flexibility to do their jobs efficiently, and hold them accountable for the results. It is also consistent with our efforts over the past several years to define and implement Contractor Assurance Systems (CAS) at all of the DOE/NNSA laboratories. The CAS model is based on the principle that DOE sites and headquarters, in partnership with the laboratories and their parent contractors, will enable mission accomplishment while performing their contract management, oversight, and performance evaluation responsibilities. Thus, DOE's role is to partner with the contractors, validate and verify the effectiveness of the contractors' systems, and provide feedback. In turn, the laboratories and their parent contractors are responsible for driving mission outcomes and delivering effective performance. All of these activities are works-in-progress and require sustained commitments by both the Department and our contractors.

This initiative is consistent with other DOE/NNSA-wide activities that I have initiated to enhance the relationship between the laboratories, sites, and headquarters, improve the way we do business, increase efficiency; and maintain safe, secure, and responsible operations at our sites. Here are some examples of recent/ongoing efforts aimed at reshaping our relationship:

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- The NNSA Administrator has initiated monthly executive VTCs with the executive core from labs, plants, and headquarters, and has hosted two off-site retreats. Similarly, within the Office of Science, the Director has for many years hosted quarterly, day-long meetings with the 10 SC laboratory directors to discuss programmatic as well as operational issues of interest to both parties.

BUDGETING FOR REQUIREMENTS

Subcommittee. This Committee has seen all too often major projects proposed by the Department get ramped back as their costs have escalated. Sometimes, as in the case of the Waste Treatment Plant, the schedule gets altered. In the case of the Uranium Processing Facility, the occupation schedule is shifting. And in the case of the Plutonium Dismantlement and Conversion Facility (PDCF), you've fully cancelled the construction of the new building.

It seems to me as if the Department develops plans for what you'd like to have, not for the minimum of what you must have. This has led to a credibility problem for the Department whenever we see your numbers. We know that there's much more flexibility in those requests than would appear to someone who doesn't know your poor track record. What specifically are you doing to address this credibility problem?

Secretary Chu. The Department has made significant enhancements in its project and contract management practices as a result of the Root Cause Analysis and Corrective Action Plan efforts. With respect to defining needs versus wants, DOE has significantly improved the front-end planning requirements codified in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* (November 29, 2010). For example, DOE has adapted a standard industry tool, the Project Definition Rating Index (PDRI) developed by the Construction Industry Institute (CII). The PDRI encompasses all activities from pre-conceptual through final design, and places a major emphasis on the extent of project definition in the conceptual design phase of the project that includes Critical Decision 1, Approval of Alternative Selection and Cost Range. The PDRI is a best-practice tool that aids in communication and promotes alignment between the owner (DOE) and its contractors by highlighting poorly defined scope definition areas. CII research has proven that higher levels of front-end planning effort can result in significant cost and schedule savings, and influences project success.

Another important change codified in DOE Order 413.3B, was to stabilize project funding and affordability by adhering to baseline funding profiles for incrementally funded projects in annual budget requests. Given the budget constraints that impact all of government, these requirements will promote more rigorous prioritization of projects based on what is needed and affordable.

COST ESTIMATING

Subcommittee. What actions has the Department taken to ensure that investment decisions at the Department are undertaken with adequate information on project costs, including costs incurred by displacing scope to the future within a program?

Organizationally, the Department has placed the responsibility for establishing updated requirements and policies related to contract and project management within the Office of Engineering and Construction Management and the Office of Procurement and Assistance Management. It seems a rather cumbersome arrangement when the fundamental issue seems to be the Department's inability to produce accurate cost estimates. Can you explain this division of responsibility?

Secretary Chu. A number of activities have been undertaken and are underway to improve contract and project management, inclusive of cost estimating practices, within the Department. The Office of Engineering and Construction Management (OECM) and the Office of Procurement and Assistance Management (OPAM), both within the Office of Management, a staff office reporting to the Deputy Secretary of Energy, are responsible for establishing and overseeing the implementation of updated contract and project management policies and requirements. The line management organizations and field operations are responsible for implementing these new policies and requirements within the projects. The Department consolidated previously existing duplicative cost estimating and analysis functions with the existing functions and mission already in place within OECM. With the release of DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* (November 29, 2010), OECM is now invested with the authority and responsibility for the preparation of independent cost estimates (ICE) and conduct of independent cost reviews (ICR) for projects costing $100M or more. This management structure allows direct access to the Department's senior management including the Deputy Secretary, who serves as the Department's Secretarial Acquisition Executive, and facilitates collaboration with the Program Offices and field offices on cost estimating improvement initiatives.

ENVIRONMENTAL MANAGEMENT SHIFT TO NNSA

Subcommittee. Mr. Secretary, last year you moved the responsibility of the Environmental Management portfolio to the Under Secretary for Nuclear Security, currently Tom D'Agostino. While I have great respect for Tom, I also had great concerns about the merits of this shift especially since the Department did not bother to consult with Congress on making such a major move. You've had six months or so to see any impacts of the shift. Are there any efficiency or oversight improvements that you could share with the Committee?

Secretary Chu. This realignment, which was effective August 2, 2012, shifted the reporting chains for Environmental Management and Legacy Management at the Under Secretary level. It is important to note that EM and LM did not become part of the National Nuclear Security Administration (NNSA).

The realignment more closely organizes the Department's resources to capitalize on the expertise that exists throughout the Department on project management, nuclear materials and waste, and nuclear safety and security. The idea of placing EM and LM under the leadership of the Under Secretary for Nuclear Security makes a great deal of sense in that context.

Through the realignment we are leveraging lessons learned and best practices in business and project management across the common core of expertise. There are natural synergies between EM, NNSA and LM. Some examples of EM and NNSA coordination and collaboration include:

- H-Canyon - At Savannah River, EM and NNSA are working closely together to utilize EM's H-Canyon facilities to maximize the use of this facility while supporting multiple missions including: converting about 3.7 MT of Plutonium into suitable feed for NNSA's Mixed Oxide (MOX) Field Fabrication Facility, R&D to remove contaminants on Plutonium to make it amenable for use as MOX feed, R&D to support advanced safeguards initiative and reducing the amount of Plutonium that EM needs to package to send to WIPP for disposal. In addition to the $150M per year base funding for H-Canyon from EM, NNSA is providing about $20 million a year in incremental funding to produce the plutonium oxide feed material, continuing to employ specially trained personnel at the site.

- SCMC – EM has established a partnership with NNSA to build upon the success of NNSA's Strategic Sourcing/Supply Chain Management efforts, which provides an integrated standardized approach to purchasing core supplies and services across the combined EM and NNSA complex with the objective of realizing cost savings, similar to those NNSA has realized.

- Oak Ridge U233 – At Oak Ridge National Laboratory, EM and NNSA are working together to accelerate the transfer of certain components of the Uranium-233 inventory that are valuable for national security applications. This cooperative effort will support NNSA's missions related to safety, nuclear emergency response, and special nuclear material measurement and detection. This initiative will result in cost savings for the EM program and enable EM to move forward on cleanup of nuclear facilities which will allow other DOE missions to continue.

SAFETY OF NUCLEAR FACILITIES

Subcommittee. Mr. Secretary, serious issues involving nuclear safety at the Waste Treatment Plant have come to light over the last couple of years, yet the Department has been slow to accept the extent and implications of those problems. What began as technical and project management issues have festered until they've now become embedded in the safety culture of the project. The latest report from DOE's Office of Health, Safety and Security confirms the extent of the problems and informs us the situation has continued to deteriorate over the last two years. We've asked you to take a serious inward look into the way DOE manages its projects and to report back to the Committee no later than May 1st on what can be done to ensure federal management can resolve facility design issues more quickly and foster a positive nuclear safety culture.

How are you responding to this task? What will the Department do to ensure the events at the Waste Treatment Plant are not repeated at the Department's other nuclear facility construction projects?

Secretary Chu. The Department is committed to instilling and holding managers accountable for leadership behaviors that foster a strong safety culture, and driving these behaviors through its Headquarters' organizations, field organizations and its projects, such as the Waste Treatment Plant (WTP). We are undertaking several efforts to ensure this occurs and our senior managers will be held accountable for doing so. As you know, we have accepted the recommendations made by the Defense Nuclear Facilities Safety Board (DNFSB) and adopted an Implementation Plan for DNFSB Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant.* We have also accepted all recommendations of the Department's Office of Health, Safety & Security (HSS) January 2012 report. The Deputy Secretary and I enunciated our values and expectations for nuclear safety at all DOE facilities and have communicated these expectations in writing in a widely distributed memorandum. We reiterated that all employees are expected to energetically pursue the safe performance of work and encourage a questioning work environment. DOE's culture should not only embrace, but also actively seek out evidence of potential problems so that they may be promptly corrected. No one who expresses a safety concern need fear retribution or penalty for stepping forward with a concern.

The Department, led by HSS, is currently conducting an extent-of-condition review of five DOE projects similar to WTP to determine whether safety culture weaknesses exist at those design/build projects. We have also assembled an internal team to respond to the Congressional request (referenced in this Question) for a review of safety considerations at the five nuclear facility construction projects with a total project cost greater than $1 billion. This team is currently reviewing all relevant practices including contract type, fee structure, and project and contract management policies, Federal oversight, guidance and practices at each of these projects to determine how they have helped to foster, or hinder, a positive nuclear safety culture at each project. Upon receipt of this report, I will direct any necessary actions to ensure that the safety culture issues identified at the WTP project are not repeated.

We look forward to delivering our final report to the Committee and to briefing you on the results.

FUTURE YEAR PLANNING

Subcommittee. The fiscal year 2012 appropriation included a statutory requirement for future year energy program reflecting the estimate expenditures and proposed appropriation for a period of 5 years, beginning in FY 2014. Given that the Department is in the process of developing its 2014 budget, can you give the Subcommittee some insight into the implementation of the plan?

Secretary Chu. DOE is committed to five year budget planning and has directed the Chief Financial Officer to prepare a five year budget for the FY 2014 formulation budget cycle. The current Strategic Resource Review Integrated Program Listing (SRR/IPL) data call, the tool the Department uses to build its budget, will collect 5 years of data for all DOE programs. The data collected will be analyzed by the Secretary and Deputy's Review Board Process (S/DRB) facilitating longer-term planning than has previously been done.

ACCOUNTABILITY OF PROJECT MANAGERS AND CONTRACTORS

Subcommittee. Given recent events concerning major construction and engineering projects, the Waste Treatment Plant for example, it is imperative the Department's cost estimates for its major projects that are more accurate, reliable, and can be used to hold project managers and contractors accountable for project performance.

What gives you adequate confidence in the Department's cost estimating capability?

Secretary Chu. A fundamental tenet written into DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* (November 29, 2010), is that a project sponsor should never be the sole cost estimator, at any stage in a project's lifecycle, and the second cost estimator should come from outside of the line manager's chain of command, to ensure objectivity. As further denoted in DOE Order 413.3B, the Office of Engineering and Construction Management (OECM), within the Office of Management, a staff office with direct reporting authority to the Associate Deputy Secretary and the Deputy Secretary of Energy, has overall lead in the Department for cost estimating policy relating to capital asset projects as well as the preparation of independent cost estimates (ICE) and conduct of independent cost reviews (ICR) for projects costing $100M or more.

ICEs and ICRs conducted by OECM are led by its Federal staff certified in cost estimating and engineering (e.g., Association for the Advancement in Cost Engineering (AACE) certification). To the extent necessary, experienced and certified cost estimators/analysts from industry who are well-versed in state-of-the-art cost estimating methods augment the Department's Federal staff in conduct of ICEs and ICRs. OECM conducts these ICEs and ICRs consistent with the GAO *Cost Estimating and Assessment Guide* principles and best practices, especially the 12-step cost estimating process embodied within DOE Guide 413.3-21, Cost *Estimating Guide* (May 9, 2011).

NEED FOR INDEPENDENT PROJECT EVALUATION

Subcommittee. Many federal agencies, for example the Department of Defense and NASA, take advantage of independent project evaluation and oversight organizations that have a "seat at the table" with the agency's senior leadership. I do not see any equivalent organization of substance at DOE.

Today, how do you obtain truly independent project evaluation and oversight?

Given DOE's investment in construction and engineering projects, have you considered creating an Office of the Chief Engineer, with responsibilities for providing you with an honest evaluation of proposed and ongoing projects?

Secretary Chu. A new Office of the Chief Engineer would be redundant with existing independent project evaluation and oversight capabilities within the Department. As initially established in FY 2000, and as reaffirmed in the revised DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* (November 29, 2010), the Office of Engineering and Construction Management (OECM), within the Office of Management, a staff office with direct reporting authority to the Deputy Secretary of Energy, has overall lead in the Department to: serve as the principal point of contact relating to project management; develop and oversee implementation of policy, requirements and guidance for the planning and acquisition of capital assets; support the Secretary, Deputy Secretary, Under Secretaries and Program Secretarial Officers in the acquisition management process; and establish, maintain and execute an independent corporate project review and reporting capability to provide an independent assessment and analysis of project planning, execution and performance.

As a result of the Root Cause Analysis and Corrective Action Plan efforts to improve contract and project management, OECM spearheaded the effort to replace the original Project Assessment and Reporting System (PARS) with an enhanced commercial off-the-shelf system (PARS II) which allows for electronic upload of accurate, timely, complete, and verifiable project performance data directly from our contractors' project management systems. This is intended to eliminate errors and delays inherent in the original system and enhance data reliability – improvements advocated by

the Government Accountability Office and the Congress. PARS II allows greater transparency in the performance of projects, and facilitates the efforts of programs and oversight staff to analyze, track, and validate the data in order to maintain leadership awareness of project status and to effect appropriate corrective actions in a timely manner.
Another improvement driven by the Root Cause Analysis and Corrective Action Plan, codified in DOE Order 413.3B, and overseen by OECM, is the implementation of Project Peer Reviews, a best practice successfully employed by the Office of Science, across the Department. Project Peer Reviews provide a means to monitor project development and execution and foster sharing of design, procurement and construction lessons learned by leveraging federal and contractor staff from across the complex that have requisite knowledge, skills and experience for particular projects, disciplines, and phases. Project risks and how they are effectively being managed are central to these reviews. Results of these Project Peer Reviews are provided to the Headquarters' Acquisition Executive soon after completion of the review.

As necessary, the monthly PARS II data and project assessment reports from OECM, along with input from the Project Peer Review teams is synthesized and presented to the Deputy Secretary in regular project management review meetings, and occasionally focused reviews ("deep dives") on projects experiencing significant issues.

USEC

INTELLECTUAL PROPERTY PROTECTION

Subcommittee. Mr. Secretary in a January 12 letter to Congress, you noted that DOE's assumption of $44 million in USEC's liability occurred "while taking precautions to protect taxpayers." As you know, the technology that USEC is trying to prove out was originally developed by the Department of Energy, transferred to USEC, and then further developed by them. Exactly what are those precautions and what is the status of this agreement?

Secretary Chu. The Department seeks to support a domestic enrichment capability by entering into a cooperative agreement for a full scope Research, Development, and Demonstration (RD&D) project to take place in FY 2012 and FY 2013. For the full-scope RD&D project, USEC and its partners will be required to share in the costs of the project and to provide the Department with intellectual property rights that will allow the U.S. Government to carry out a long-term indigenous enrichment program, with or without private sector participation. While continuing to work with Congress to transfer funds in fiscal year 2012, the Department is taking title to, and eventual deposition responsibility for, the depleted uranium tails present liabilities worth approximately $44 million; providing Russian-origin natural uranium feed to USEC; and, in return, receiving title to U.S.-flagged low-enriched uranium that can be used to support tritium production. This transaction will enable USEC to spend up to $44 million to keep manufacturing firms engaged in supplying critical key components and engineering services for the American Centrifuge Project, while allowing the Department to acquire needed domestic origin low-enriched uranium for the tritium program. In the event that the full scope RD&D project is not implemented, taxpayers would be protected because the Department would retain the valuable low-enriched uranium asset.

Subcommittee. If USEC were to fail, what would happen to the intellectual property?

Secretary Chu. The contract for the RD&D program will contain a condition that the Department of Energy receives the intellectual property rights and access to associated technical data it needs for the American Centrifuge technology.

Subcommittee. What, if anything, should be done to ensure that the government's interest is protected?

Secretary Chu. We have structured the transaction in a fair and reasonable manner, ensuring full benefits for both the public and USEC. The Department would enter into a full scope RD&D program with USEC and its partners provided that it would have access to intellectual property rights that will allow the U.S. Government to carry out a long-term indigenous enrichment program, with or without private sector participation. Additionally, by taking title to the U.S. origin LEU referenced above, taxpayers would be protected because the Department would retain the valuable low-enriched uranium asset in the event that the full scope RD&D project is not implemented, in addition to the IP rights the Department would require as part of a cooperative agreement.

TRANSFER AUTHORITY FOR FISCAL YEAR 2012

Subcommittee. Mr. Secretary, I understand that the Department is still actively pursuing transfer authority, in the amount of $106 million, for FY 2012. Is this true?

Subcommittee. Why is this funding needed, if USEC is a private company?

Secretary Chu. This investment in domestic uranium enrichment technology provides the US Government with a national security capability of indigenous uranium enrichment and the Department of Energy with important intellectual property rights. Both of these are important capabilities for the USG to maintain, irrespective of private sector participation.

Subcommittee. If you do not receive this transfer authority, would you still need the $150 million in fiscal year 2013?

Secretary Chu. The Department is currently evaluating its options but continues to seek transfer authority from Congress. Although the FY13 funding would build on that which is proposed for FY12, the national security objectives for the FY13 funding request are valid irrespective of the Department getting the transfer authority.

FUNDING SOURCES

Subcommittee. Mr. Secretary, your budget request includes $150 million for USEC within the nonproliferation account. You have noted before that the ACP's success would "strengthen and protect America's national security interests". These purported national security interests seem to relate primarily to the ability to produce tritium for the weapons complex. What is the logic in requesting this funding within nonproliferation and not say, Nuclear Energy or Weapons?

Secretary Chu. The funding is requested within the Defense Nuclear Nonproliferation account because this research, development, and demonstration (RD&D) program benefits nuclear nonproliferation as follows:

- With access to domestic uranium enrichment industrial facilities and their associated knowledge base, with full rights to intellectual property, this investment further supports NNSA's national security and nonproliferation mission by improving our understanding of fundamental issues related to developing capabilities to detect, deter, and assess proliferation of new uranium enrichment programs around the world.

- This investment maintains global leadership in the effort to minimize the spread of enrichment technology by contributing directly to sustained confidence in the international commercial enrichment market. Nations that rely on nuclear power for electricity generation will be less motivated to develop their own uranium enrichment capability if they are confident that they can obtain fuel in the commercial market.

Subcommittee. Mr. Secretary, are you telling me that the only way the US can have a seat at the table in these negotiations is to support the construction of ACP? We know how this technology works, we have substantial knowledge of the alternative technologies, I find it difficult to believe this is the only path that would give us standing in these discussions.

Secretary Chu. We strongly believe there is a need to do RD&D to maintain a domestic uranium enrichment capability. Having a domestic capacity for uranium enrichment has important national security and nonproliferation implications, including the ability to detect proliferant programs, produce tritium, and discourage the unnecessary spread of enrichment technology by contributing directly to sustained confidence in the international commercial enrichment market. The most promising path forward for establishing a domestic enrichment capability is the ACP.

Subcommittee. Should the Congress provide this funding, or if you receive the authority to transfer FY 2012 funding, how do you plan to address intellectual property issues in order to protect the taxpayer's interests in the event of a bankruptcy? [ACP is a refined version of DOE intellectual property]

Secretary Chu. The cooperative agreement for the RD&D program will contain a condition that the Department of Energy receives full government use rights to intellectual property for the American Centrifuge technology.

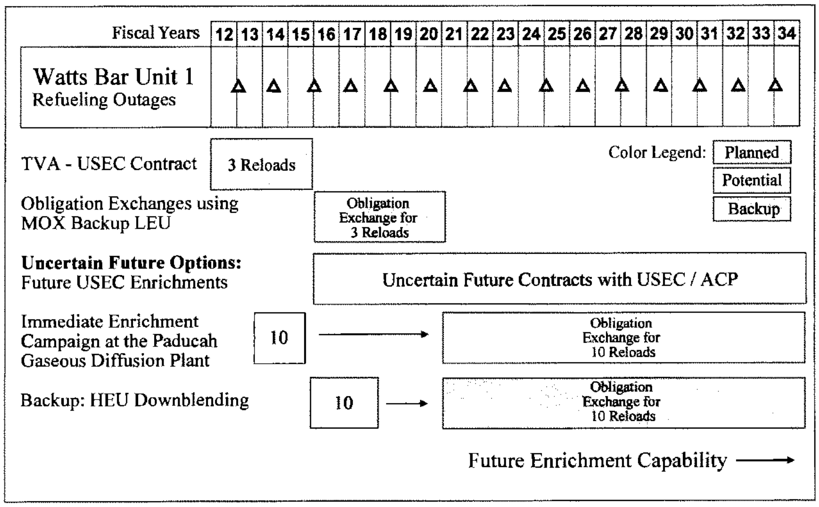
TRITIUM REQUIREMENTS

Subcommittee. Mr. Secretary, what are the alternatives to ACP for tritium production and what is the necessary timeline for additional production capability? Please provide the Committee with a cost-benefit analysis comparing the development and use of ACP, use of the facilities at Paducah, down-blending, and purchase of tritium from strategic partners to meet our strategic need for tritium.

Secretary Chu.

(1) Alternatives to ACP for tritium production

Ultimately the long-term plan will depend on what happens with the Paducah Gaseous Diffusion Plant and the ACP. More importantly, DOE/NNSA has the ability to provide unobligated fuel to the Watts Bar reactor through 2020 (as illustrated in Figure 1).


Fiscal Years
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
Watts Bar Unit 1
Refueling Outages
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TVA - USEC Contract
3 Reloads
Color Legend:
Planned
Potential
Backup
Obligation Exchanges using MOX Backup LEU
Obligation Exchange for 3 Reloads
Uncertain Future Options:
Future USEC Enrichments
Uncertain Future Contracts with USEC / ACP
Immediate Enrichment Campaign at the Paducah Gaseous Diffusion Plant
10
Obligation Exchange for 10 Reloads
Backup: HEU Downblending
10
Obligation Exchange for 10 Reloads
Future Enrichment Capability

Today, USEC is under contract to TVA to provide three more reloads to the Watts Bar I reactor. After 2015, obligations can be exchanged between material being down blended for the MOX program, i.e. the MOX Backup

Low Enriched Uranium (LEU), and LEU that TVA would purchase to fuel Watts Bar if it could not obtain unobligated material. After 2020, a number of options are possible, as illustrated in Figure 1, for obtaining LEU. Decisions would have to be made in the near term, however, to make LEU available for future use. If no other options are available, then NNSA would down blend HEU to meet this programmatic requirement. This would, however, be an option of last resort because the HEU is a valuable asset for both NNSA and the Naval Reactor Program. The supply is limited and there is no current capability to produce new HEU and thus replace consumed material.

In the timeline above, note that tritium production to support the enduring stockpile needs are met through about 2034 with the assumed immediate enrichment campaign at the Paducah Gaseous Diffusion Plant. Though shown in Figure 1 on the same timescale as the immediate enrichment campaign, if ACP plans cannot be implemented, then the Backup, HEU downblending 10 reloads could be phased to start in 2035 to run till approximately 2050.

The Department is exploring options to extend operation of the Paducah Gaseous Diffusion Plant and to produce additional unencumbered LEU that could support tritium production.

(2) Timeline for additional production capability

As illustrated in Figure 1, unobligated uranium fuel is an indefinite, recurring requirement. Thus, a domestic, or unobligated, LEU production capability is required as long as the United States maintains a nuclear deterrent. At full production, the reactors in which tritium producing targets are being irradiated will require a reload of approximately 43 MT of 4.55% U-235 uranium oxide fuel every 18 months. USEC is under contract to TVA to provide unobligated fuel through FY2015. After 2015, the MOX backup LEU will be used to provide an additional three reloads to 2020. After 2020, the program could use inventories of LEU, if available from enrichment of normal uranium or uranium tails, or could down blend HEU, to fabricate unobligated uranium fuel. If ACP was available, then it would provide a capability to continuously supply unobligated fuel for the tritium producing reactors.

(3) Cost-benefit analysis comparing the development and use of ACP, use of the facilities at Paducah, down-blending, and purchase of tritium from strategic partners to meet our strategic need for tritium.

There is insufficient information available about the economics of the ACP operation to provide a definitive cost-benefit analysis. The range of outcomes is between an operation that is potentially commercially viable and price competitive to one that is uneconomical and requires subsidies to survive. The Department is exploring options to extend operation of the Paducah Gaseous Diffusion Plant and to produce additional unencumbered LEU that could support tritium production. The facilities at Paducah currently require approximately 10% price premium over market-priced commercial enrichment facilities. There is no information yet about how much of a premium would exist for LEU produced by the ACP. An analysis performed in 2011 estimated the cost of producing LEU to support 15 years' worth of tritium production under three scenarios: 1) by enriching DU, 2) by enriching NU, and 3) by downblending HEU. The costs are summarized in Figure 2.

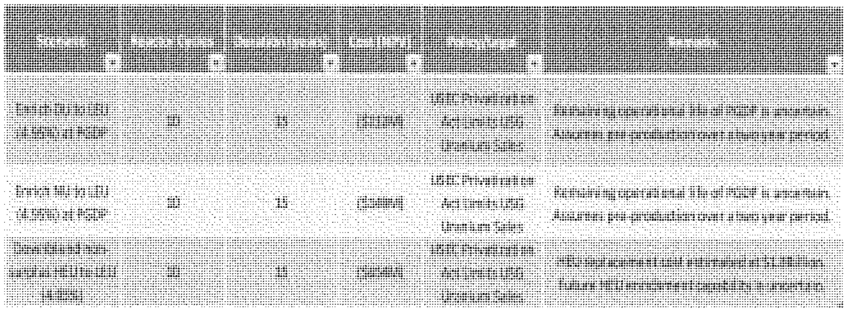

Figure 2 _ Cost (NPV) of Producing unencumbered LEU for Tritium Production

Downblending HEU would be an option of last resort because HEU is a valuable asset, the supply is limited, and there is no current capability to produce new HEU and thus replace consumed material, which will be needed for NNSA missions, including Naval Nuclear Propulsion.

Finally, we are not aware of any opportunities to source tritium from strategic partners.

There are two components for U.S. Government costs for LEU to support tritium production. At the full planned production rate, there is a cost of approximately $20M per cycle for excess fuel and enrichment required to compensate for the presence of 1700 Tritium Producing Burnable Absorber Rods (TPBARs) in one TVA reactor (based on current spot price for uranium feed and enrichment). In addition, the U.S. pays a premium for an enrichment price differential, to provide unobligated enrichment for the entire reactor core. This is approximately 10% of the cost of the core without TPBARs, and it is approximately $8M per cycle under the current contract with USEC based on enrichment from GDP. The enrichment price differential is computed by TVA based on the difference between the SWU price from GDP compared to the price of obligated enrichment that TVA purchases on the open market for reactors not involved in tritium production. The future cost for maintaining unobligated fuel from ACP would be derived from the difference between the SWU price at ACP and the price of SWU coming from TVA's other commercial contracts for enrichment. This would not have any specific timeframe, other than to continue for the life of the tritium production program, as long as ACP is able to provide market-priced enrichment services.

CLEAN ENERGY RESEARCH AND DEVELOPMENT

TECHNOLOGY TRANSFORMATION

Subcommittee. The Department has an important role to play in not just identifying promising new technologies, but helping to bring their cost into line with what the marketplace can support. This is research and development that the private sector has little incentive to invest in on its own, since they're not likely to see a return on that investment in a reasonable timeframe.

Mr. Secretary, what promising technologies do you see on the horizon, and what specifically would you like to highlight in your request to bring down their cost? Over what timeframe?

Secretary Chu. A technology must satisfy several criteria to warrant a targeted initiative centered on bringing costs in line with marketplace demands; chief among these are maturity, materiality, and market opportunity. The Department described its strategic approach to technology R&D in the recently published Report on the First Quadrennial Technology Review (QTR) (http://energy.gov/sites/prod/files/QTR_report.pdf). Solar power has been identified as an area of technology that is well suited for a coordinated effort with a goal of achieving cost reductions that will facilitate and accelerate marketplace adoption, and the Department has developed the SunShot Initiative accordingly (http://www1.eere.energy.gov/solar/sunshot/index.html).

Beyond those technologies that satisfy the maturity, materiality, and market criteria necessary for a targeted initiative, the Department also maintains moderate levels of R&D to facilitate breakthroughs that could fundamentally change the techno-economics of clean energy and efficiency technologies over the longer term. Some example areas of particular interest include small modular nuclear reactors, silicon nanotubes for flexible thermoelectric devices that convert waste heat to electricity, organic photovoltaic materials, and new battery concepts and materials, such as carbon nanofiber paper that could quadruple the density of energy storage.

EERE – RATIONALE FOR BUDGET INCREASE

Subcommittee. Mr. Secretary, your budget request includes a substantial increase ($527 million) for Energy Efficiency and Renewable Energy, in a constrained budget environment, what is the justification for such an increase?

Given that some analyses identify natural gas, coal, and nuclear as the most promising forms of reliable electricity for the next 50 years or so, and your budget request would actually cut support for improving these vital resources, what analysis led you to arrive at these specific increases?

Secretary Chu. As part of the President's commitment to an 'all of the above' energy strategy, DOE requests an increase for FY13 to energy efficiency and renewable energy programs (EERE) as well as for fossil energy programs and the nuclear energy program.

Importantly, the FY 2013 request upholds the President's goal to increase American competitiveness and lead the world in research, deployment, demonstration, and deployment of clean energy technologies to reduce the nation's reliance on foreign oil. Specifically, the FY2013 request accelerates groundbreaking investments in transportation systems and alternative fuel development, as well as promotes innovative energy-efficiency manufacturing processes that will reduce costs of manufacturing by using less energy.

The Department's mission of addressing America's energy challenges through transformative science and technology solutions requires careful analysis and deliberation to develop a balanced portfolio of basic science and research, development, demonstration and deployment. To ensure the right funding profile, DOE uses strategic analysis to identify and prioritize the most appropriate portfolio. This process incorporates an in-depth integrated review by technical experts and senior leadership with the mindset of a shared vision of the applied energy programs. Coupled with detailed technology-specific road-mapping and analysis these investment decisions are also driven by a comprehensive set of economic, environmental, and energy security mandates.

Subcommittee. At a time when funding increases absolutely must be reserved for the most worthy programs, what analysis and planning have you done to ensure that these large increases can actually be spent in one year?

Secretary Chu. In his State of the Union speech, President Obama presented his plan for a U.S. economy built to last. Central to this effort is the President's commitment to safely and responsibly harnessing America's domestic energy resources in an "all of the above strategy." Renewable energy technologies and energy efficiency solutions play key roles in this strategy.

The FY 2013 request supports the President's goals and helps maintains America's competitive edge through strategic investments in clean energy technologies and energy efficiency solutions. To compete globally, we must do more than invent technologies, we also have to produce and sell them. The Department's work on energy efficiency and renewable energy is a key to our success.

Transparent analysis, planning, and performance assessments are undertaken at every tier of program management to identify, prioritize, and determine the critical path and performance necessary to achieve program goals. Overall, EERE priorities are reviewed by EERE's Advisory Committee, and many other technology-specific panels and workshops that include representatives from a wide range of businesses, universities, and other organizations. These groups help ensure that EERE is focused in the correct technology areas, accelerating progress, and is working to form effective partnerships and to efficiently leverage Federal funding while avoiding internal overlaps. In addition, EERE has historically demonstrated the ability to obligate its annual appropriations, produce Funding Opportunity Announcements, make selections and awards and will furthermore benefit from the processes developed to support the obligation and costing of $16 billion in Recovery Act funds.

Subcommittee. Mr. Secretary, your staff has stated that projects funded from within EERE cannot be terminated for non-performance given the nature of the agreements that are signed with the recepients. This seems fundamentally irresponsible, would you agree? What are you doing to address this issue?

Secretary Chu. Later stage applied research and development (R&D) financial assistance agreements have hard performance based stage gates with clear "go/no go" decision points. Given the nature of early stage R&D many of these financial assistance agreements do not have strict performance criteria but are closely monitored to ensure program objectives are obtained.

EERE has implemented a robust project management and evaluation program that is applied to all financial assistance agreements award recipients regardless of the technology readiness level associated with the work. As such, project performance is monitored and assessed on a regular basis by EERE senior management. Over the past several years EERE has discontinued or cancelled over 25 projects resulting in approximately $10 million in recoveries and avoidance of over $140 million in out-year mortgages.

PRIORITIZING EERE ABOVE SCIENCE

Subcommittee. Secretary Chu, I understand we are working within tight constraints, but I'm concerned about how you are proposing to distribute funds within those constrains. Your budget request proposes to increase funding for Energy Efficiency and Renewable Energy by $522 million — a 29 percent increase — while increasing Science research by just $100 million. Given some scheduled increases in funding commitments within the Science programs, this means Science gets squeezed while several Energy Efficiency and Renewable Energy programs are increased by 35, 40, and even 150 percent.

Given the importance of Science research for maintaining American leadership in science and innovation, and for enabling future revolutions in the energy sector, what is your reasoning for putting more of your increases in funding to the applied Energy Efficiency and Renewable Energy programs?

Secretary Chu. The Department of Energy invests in research, development, and deployment across a wide variety of technologies at many stages of development. The Office of Science is the lead federal entity supporting fundamental scientific research for energy and the Nation's largest supporter of basic research in the physical sciences. ARPA-E focuses exclusively on high risk, high payoff concepts, filling a former gap in the Department's portfolio. For applied energy technologies, the Office of Fossil Energy, Office of Nuclear Energy, Office of Energy Efficiency and Renewable Energy, and the Office of Electricity Delivery and Energy Reliability carry out targeted, use-inspired research and development, as well as a variety of deployment projects for energy sources that have strong potential for economic viability in the near-term. In each case, the blend of activities is selected through careful program management and regularly reevaluated for effectiveness. Through the strategic planning processes, DOE ensures the appropriate balance of research and development activities across these offices. These programs also work with a variety of university, National Lab, and private company partners based on the maturity and characteristics of the technology or system.

PROPOSAL FOR ADDITIONAL HUB

Subcommittee. The Congress has funded five new Energy Innovation Hubs in the last three years. This was done after careful consideration, and with the acknowledgement that we must now wait and see whether this new research model works. In this year's budget request, the Department proposes yet another Hub, the "Electricity Systems Hub."

It seems entirely too early to know whether the existing hubs are working — while they may have promise, they're really just getting going. Isn't it too early to propose yet more Hubs?

Secretary Chu. The three awarded Hubs have made robust progress in creating a critical mass of multi-disciplinary research in their respective areas, enabling new approaches to challenging, high-priority technical barriers. In accordance with language in House Report 112-331 to H.R. 2055 (the Consolidated Appropriations Act of 2012), DOE will soon be providing a report to Congress detailing milestones and performance goals for the Hubs.

Subcommittee. What hard data do you have showing that the five existing Hubs are performing well?

Secretary Chu. As stated above, DOE will be providing a report to Congress soon in accordance with language in House Report 112-331 to H.R. 2055, detailing milestones and performance goals for the Hubs.

Subcommittee. We're told by the Department that this proposed Hub would be, in actuality, 2 or 3 smaller "hublettes" or "spokes" perhaps, located in different regions in the country and working completely independently. This sounds like yet another new research model, even more unproven than the existing Hubs. Why have you called this proposal an Energy Innovation Hub?

Secretary Chu. The Electricity Systems Hub is consistent with the Energy Innovation Hub model in that it will institute an integrated, multi-disciplinary, systems approach to address a critical issue facing the Nation. The specific structure, scope, and operation of each Energy Innovation Hub must be tailored to the specific nature of the problem being addressed to achieve the most effective and innovative results. The unique challenge facing the Electricity Systems Hub is that it addresses innovation in the electric power system, a complex machine that physically spans the Nation.

The Department is considering implementing two to three regional hubs in recognition of the regional and local differences in resources, generation technologies, loads, oversight, markets, and operations inherent in the U.S. power system. Sharing and comparing differences between the regional hubs will help identify nationwide solutions as well as address the unique regional challenges that are vital to a robust portfolio approach to grid modernization.

SOLID STATE LIGHTING MANUFACTURING AND CONGRESSIONAL DIRECTION

Subcommittee. Mr. Secretary, would you agree that manufacturing is a particular focus of this year's budget request?

Secretary Chu. A report by the National Science and Technology Council, "A National Strategic Plan for Advanced Manufacturing," stated that advanced manufacturing is a matter of fundamental importance to the economic strength and national security of the United States. Recognizing the importance of the manufacturing sector to America's future, the Energy Department pursues strategic opportunities to work with industry, small business, universities, and other stakeholders to identify and invest in emerging technologies with the potential to create high-quality domestic manufacturing jobs and enhance the global competitiveness of the United States.

Subcommittee. This Committee shares your concerns about and focus on manufacturing. In fact, we've supported manufacturing in a variety of ways over the last several years. Let's discuss one example: the fiscal year 2010 House Committee report increased funding for the solid state lighting research program, and, and I quote: "encourages the Department to carry out a lighting technology research and development program to assist manufacturers...to lower manufacturing costs."

And again, in the fiscal year 2012 House report, the Committee once again reiterated its support for manufacturing by saying (and I quote once again): "In its fiscal year 2010 report, the Committee encouraged the Department to fund research aiming to lower manufacturing costs, and the Committee continues to support this research in conjunction with core technology and product development research within this program."

Finally, the fiscal year 2012 conference report finalizes funding levels by saying: "The conferees provide $25,832,000 for lighting research and development, to include $12,000,000 for research and development into manufacturing improvements for general illumination solid state lighting."

And so, it seems we are in agreement on the importance of manufacturing.

Given our direction, would you agree that the program in fiscal year 2012 would devote $12 million to the manufacturing research area, and is free to fund put the balance of funds to its other research areas — core technology and product development?

Secretary Chu. The Solid-State Lighting (SSL) Program addresses improvements in lighting quality, efficacy, and cost; and has three elements in the R&D Portfolio: Core Technology, Product Development, and Manufacturing R&D. The first two elements are linked to manufacturing, as applied research and product development must relate to a manufacturable product. A balanced strategy with all three elements is needed to move the technology to market. In 2009, DOE started a specific Manufacturing R&D Initiative to reduce the cost of SSL sources and luminaires; improve product consistency (while maintaining high quality products); and encourage a significant role for domestic U. S. based manufacturing in this country. The R&D program planning entails a series of roundtables and workshops to engage the R&D community in preparation of "roadmaps" that note high priority tasks to appear in DOE solicitations. The portfolio of active SSL R&D projects presently has a strong emphasis on manufacturing, with the funding split out by: Core – 24%, Product – 18%, and Manufacturing – 58%. For FY12, approximately $5 million is supporting existing manufacturing projects, while approximately $7 million will be allocated for new manufacturing awards before the end of the fiscal year for a total of $12 million.

Subcommittee. Congressional intent certainly seemed clear, $12 million for the manufacturing research activity. And yet, your fiscal year 2013 budget request documents indicate that the Department is putting only $3.4 million to new manufacturing grants.

Secretary Chu, wouldn't you agree that this is both clearly contrary to congressional direction, and contrary to the Administration's high priority for support of American manufacturing?

Secretary Chu. The Solid-State Lighting (SSL) Program addresses improvements in lighting quality, efficacy, and cost; and has three elements in the R&D Portfolio: Core Technology, Product Development, and Manufacturing R&D. The first two elements are linked to manufacturing, as applied research and product development must relate to a manufacturable product. A balanced strategy with all three elements is needed to move the technology to market. In 2009, DOE started a specific Manufacturing R&D Initiative to reduce the cost of SSL sources and luminaires; improve product consistency (while maintaining high quality products); and encourage a significant role for domestic U. S. based manufacturing in this country. The R&D program planning entails a series of roundtables and workshops to engage the R&D community in preparation of "roadmaps" that note high priority tasks to appear in DOE solicitations. The portfolio of active SSL R&D projects presently has a strong emphasis on manufacturing, with the funding split out by: Core – 24%, Product – 18%, and Manufacturing – 58%. For FY12, approximately $5 million is supporting existing manufacturing projects, while approximately $7 million will be allocated for new manufacturing awards before the end of the fiscal year. For FY13, DOE will continue to place appropriate emphasis on SSL manufacturing R&D, with balance on other elements of the program.

Subcommittee. Mr. Secretary, will you see to it that congressional intent and the Administration's own top priority of manufacturing are followed?

Secretary Chu. The Solid-State Lighting (SSL) Program addresses improvements in lighting quality, efficacy, and cost; and has three elements in the R&D Portfolio: Core Technology, Product Development, and Manufacturing R&D. The first two elements are linked to manufacturing, as applied research and product development must relate to a manufacturable product. A balanced strategy with all three elements is needed to move the technology to market. In 2009, DOE started a specific Manufacturing R&D Initiative to reduce the cost of SSL sources and luminaires; improve product consistency (while maintaining high quality products); and encourage a significant role for domestic U. S. based manufacturing in this country. The R&D program planning entails a series of roundtables and workshops to engage the R&D community in preparation of "roadmaps" that note high priority tasks to appear in DOE solicitations. The portfolio of active SSL R&D projects presently has a strong emphasis on manufacturing, with the funding split out by: Core – 24%, Product – 18%, and Manufacturing – 58%. For FY12, approximately $5 million is supporting existing manufacturing projects, while approximately $7 million will be allocated for new manufacturing awards before the end of the fiscal year. For FY13, DOE will continue to place appropriate emphasis on SSL manufacturing R&D, with balance on other elements of the program.

TRANSITION AWAY FROM MULTI-YEAR GRANTS

Subcommittee. Mr. Secretary, the Committee has been concerned that multi-year grants have become so common in the Department's energy and science offices that many programs must devote the vast majority of funds each year paying off commitments to awards it gave out in prior years. Not only does this practice prevent your programs from adapting to new technology and market conditions each year, it also promises future money that your programs simply do not know will be appropriated.

To address this problem, the fiscal year 2012 appropriations conference report included direction for the Department to transition away from multi-year grants within the Department's energy programs.

Unfortunately, it appears that the Department is not following this direction. For example, last week you announced a grant opportunity to lower the cost of solar energy, called "Bridging Research Interactions through Collaborative Development Grants in Energy." The grant announcement promises $9 million in grants. Unfortunately, the Congress has not yet appropriated six million of those dollars.

Mr. Secretary, is there any reason why these grants have to be funded by promising future-year funds? Couldn't, for example, the grant I mentioned carve out $9 million of fiscal year 2012 funds from the $290 million Solar program?

Secretary Chu. We will continue to work with Congress on implementing their multi-year funding guidance contained in the FY 2012 appropriation language. FY 2012 is a transition year where pre-appropriation planning was conducted in advance to ensure continuity of the programs and allow funds to be awarded within a reasonable time period after completion of the appropriations process. Prior to release of new FY 2012 FOA announcements, EERE will evaluate multi-year FOAs and work to minimize out-year mortgage commitments.

QUADRENNIAL TECHNOLOGY REVIEW

Subcommittee. Secretary Chu, in September of last year, the Department of Energy released its first Quadrennial Technology Review.

How does the budget request reflect the results of this review?

Secretary Chu. Consistent with the recommendations of the Quadrennial Technology Review (QTR), the Office of Energy Efficiency and Renewable Energy (EERE) is de-emphasizing onshore wind, distributed fuel cells, and conventional hydro while adding emphasisto off-shore wind and computational modeling of complex environments (coupling of wind and sea states and complex terrain). EERE has shifted its investments in the mature, market-ready geothermal heat pump technologies away from technology development in the geothermal program to systems integration in the the buildings program. The biomass program is shifting its focus in order to concentrate on drop-in hydrocarbons.

The reduction to Nuclear Energy's Reactor Concepts R&D reflects a refocusing of this program on higher priority, core activities and R&D with expected nearer-term results and broader applicability.

Subcommittee. Do you think this type of technology review is useful in the absence of a more holistic "energy review" which considers not just technology development, but all energy policies?

Secretary Chu. The QTR is not a substitute for a broader interagency energy review, but it could provide a foundation for such an exercise in addition to providing strategic guidance on technology R&D investments. A quadrennial energy review (QER) would provide a multiyear roadmap laying out an integrated view of technology-neutral energy objectives, coordinated across multiple agencies. The emphasis of a QER would be on establishing government-wide goals and identifying improved pathways for the invention, translation, adoption, and diffusion of energy technologies. Recognizing the scale of the task, the President's Council of Advisors on Science and Technology recommended that a QER be implemented in a staged process.

NUCLEAR AND FOSSIL ENERGY OMITTED FROM CLEAN ENERGY INCREASES

Subcommittee. Mr. Secretary, in the State of the Union the President made a point of supporting an "all of the above" approach to energy. I thought this was a breath of fresh air and was looking forward to a more balanced budget request this year. Unfortunately, despite our fiscal year 2012 direction and the President's words, your budget request looks almost the same as last year, in that you plus up renewables while cutting nuclear and fossil. However, according to the Energy Information Agency, between now and 2035, fossil and nuclear energy supply will increase more than 800 percent more than renewable forms.

If the budget request reflects the Administration's position strongly supporting clean energy innovation, why have you not included two notable clean energy areas, nuclear and fossil energy, in your increases to clean energy research and development?

Secretary Chu. DOE believes that clean energy and energy security concerns are sufficiently compelling that all technologies that could make a significant contribution should be considered. The questions that DOE particularly focuses on in its budget prioritization deliberations include:

- What technologies can make the greatest potential contributions to energy goals? In particular would be the goal to catalyze the timely, material, and efficient transformation of the Nation's energy system and secure U.S. leadership in clean energy technologies.
- What is the appropriate Federal role, if any, to encourage the development of high priority technologies in a timeframe that is most relevant? It is important to recognize that the level of funding for a technology in a particular year does not necessarily reflect priority. For example, funding for early stage research and development will usually be lower than for technologies in the demonstration stage.

Both nuclear and fossil energy continue to be a high priority in accomplishing the Department's mission of addressing America's energy challenges through transformative science and technology solutions.

The budget request is well-aligned with the Office of Fossil Energy's (FE) priority of developing advanced technologies to ensure reliable, efficient, cost-effective and environmentally sound use of fossil fuels (coal, oil, and natural gas) to meet the United States' energy needs. FE is investing in the key enabling technologies that are on critical paths and that show the highest potential for achieving the program goals and benefits in the timeframe needed for commercial deployment. The FY13 request for the nuclear energy continues to provide a pivotal investment in Small Modular Reactors (SMR) to support design certification and licensing activities, efforts to extend the lifespan of the existing light water reactor nuclear fleet, and options and technologies for disposing of used nuclear fuel.

Subcommittee. With half of our electricity coming from coal and that unlike to substantially change for many, many decades, isn't it only responsible to invest more in making this source of energy cleaner at home?

Secretary Chu. The mission of the Coal Program's research and development (R&D) activities is to support secure, affordable, and environmentally acceptable near-zero emissions fossil energy technologies. In response to the current fiscal environment, the Department has shifted the focus of the coal program to near-term carbon capture, utilization, and storage (CCUS) technologies that have potential benefits to both existing and new fossil-fueled power plants. The FY 2013 funding request prioritizes research on key near-term CCUS technologies that can be demonstrated in the 2016 timeframe.

PROPOSED FUNDING FOR NAVY BIOFUELS

Subcommittee. Secretary Chu, the budget request proposes $40 million as well as legislative language to start a joint program with the Navy and Department of Agriculture to create a supply of bio-based jet and diesel fuel for the Navy. There is surely a benefit to our national security in reducing the military's dependence on foreign oil imports and disruptions. But with funding tight in the federal government, we have some serious concerns about putting the Department of Energy's funding to this initiative.

For your Department's role, the proposal would fund biorefineries that would produce these fuels for the Navy. As the theory goes, after this three-year investment, the price of these biofuels would come down enough to compete in the market without federal support. That, however, was the plan for cellulosic ethanol several years ago, and it's still too expensive to compete.

Is there a risk that this injection of federal support would not be enough to stand up a cost-competitive product, and that this federal investment would, in the end, be wasted? How risky is this investment?

Secretary Chu. We firmly believe that with continued research and development and financial assistance in proving out pilot-scale demonstration biorefineries and first-of-kind commercial-scale biorefineries will help lead to cost competitive biofuels that are competitive with petroleum-based fuels on an unsubsidized basis. Because creating an entirely new industry in a highly competitive fuels market is inherently risky, this is one of the reasons Federal investment is necessary to spur the private sector investment. We are building on our success with cellulosic ethanol research. An example is our investment in the area of enzymes that break down cellulosic materials to make them more amenable to conversion into fuels. Largely as a result of DOE investment in this area, the cost of enzymes has decreased over 30 fold and the enzyme industry has made investments in manufacturing of these enzymes for commercial uses. Four commercial cellulosic biorefineries to produce ethanol are now being built. We believe that the technical and financial risk can be managed across the portfolio and the benefit to decreasing oil use makes the risk worth taking.

Subcommittee. If the Department of Defense is the customer for this initiative, why should the Department of Energy pay for a large portion the expenses?

Secretary Chu. The Department of Energy is committed to this effort because it provides an early opportunity to scale up innovative biofuels technologies which are currently entering the pilot stage. DOE will also lend its expertise in the selection and management of these projects.

The Department of Defense is not the only customer anticipated to benefit from the outcomes of this initiative. In addition to DOD, commercial aviation and shipping industries are extremely interested and will likely become customers. The three agencies bring a unique set of expertise and perspectives to the issue of alternative fuels. USDA has experience primarily in the growing of biomass feedstocks, and harvesting, collecting, and storing these materials. DOE has more than a decade of activities in a number of conversion pathways to convert the feedstocks into liquid fuels. Navy is an end-user of the fuel and brings the customer's perspective to this supply chain. This integration along the supply chain has the potential to help reduce the risks associated with establishing a new industry. In addition, this initiative is a good strategic fit for DOE. We are successfully concluding efforts to reduce the cost of cellulosic ethanol and have diversified our portfolio to include hydrocarbon fuels from biomass. The advanced biofuels initiative with the Navy is an excellent fit in that strategic direction that is anticipated to lead to commercially demonstrated technologies that when replicated in the private sector has the potential to lead to a diversified fuels portfolio for the Nation.

The MOU signed by the three Secretaries stipulates that the three agencies will endeavor to share the funding burden equally. To achieve that objective, we have requested what we believe to be a reasonable amount of funding in FY13 for this initiative.

ENERGY FRONTIER RESEARCH CENTERS

Subcommittee. Secretary Chu, your request asks to increase the budget for the existing Energy Frontier Research Centers by $20 million, purportedly to create cooperation between them and the applied energy offices.

Given that this is the last year of planned funding for these centers, is it prudent to expand their funding for just the last year, especially when our overall budget will be so strained?

Secretary Chu. The 46 Energy Frontier Research Centers (EFRCs) were established in late FY 2009 for an initial 5-year award period. The EFRCs are currently undergoing mid-term peer reviews that are scheduled to be completed in the third quarter of FY 2012, after which the Department will issue a report to Congress as requested by House Report 112-331. The report to Congress will provide the Department's assessment of the EFRCs and their progress toward meeting their five-year goals.

The EFRCs were proposed as a research modality for bringing together the skills and talents of teams of investigators to perform energy-relevant, basic research with a scope and complexity beyond that found in standard single-investigator or small-group research efforts. These multi-investigator, multi-disciplinary centers integrate basic and applied research and tackle the toughest scientific hurdles to foster and accelerate basic research for building a new 21st Century clean energy economy. The Office of Science (SC) FY 2013 budget request includes a $20 million increase to leverage the $100 million annual SC investment in EFRCs for R&D jointly funded with the EERE program to accelerate discoveries and innovations for clean energy technologies. The $20 million increase for the EFRCs in FY 2013 will fully fund supplemental activities jointly with EERE and not incur mortgages in FY 2014 and beyond.

Subcommittee. How exactly would this funding be used?

Secretary Chu. The $20 million increase will supplement promising research directions at the existing EFRCs in conjunction with applied research and development supported by EERE. The SC request also includes a $15 million increase for SC user facilities—particularly light sources and Nanoscale Science Research Centers—as part of the same jointly funded R&D effort with EERE.

Subcommittee. If this is primarily intended to support the applied programs, why should it be funded within Science?

Secretary Chu. This funding is intended to facilitate direct coordination of research efforts between Science and the applied programs. The funding supports the missions of both programs. The EERE FY 2013 budget request includes increases of $25 million in its Strategic Programs office and a further $10 million within EERE technology programs for its matching portion of the collaboration with SC. The Department-wide $70 million increase will fund competitive R&D awards to accelerate the transition of novel scientific discoveries into innovative clean energy technologies. Co-funding and co-siting of scientist supported by the Basic Energy Science BES) program and the Department's applied technology programs has proven to be a valuable approach to integrate basic and applied research and accelerate technological progress. The sharing of resources, expertise, and knowledge gives basic science researchers a better sense of technology requirements and applied scientists a better understanding of material and process fundamentals, thus providing an environment conducive to technology breakthroughs. Existing efforts will play a particularly important role in successfully fostering these new jointly funded research efforts within the Department.

RISING OIL AND GAS PRICES

USE OF FUNDS FROM STRATEGIC PETROLEUM RESERVE SALE

Subcommittee. Mr. Secretary, for the second year in a row, the budget request proposes to cancel proceeds from the sale of oil from the Strategic Petroleum Reserve. Last year's proposed non-emergency sale was described as necessary for operational purposes. This year's cancellation looks to be nothing but a way to offset almost $300 million in spending elsewhere in the Department.

Is there any sort of justification for this cancellation that you haven't provided yet or is it simply the budget gimmick it appears to be?

Secretary Chu. The FY 2013 budget proposes to use SPR Petroleum Account receipts to repurchase about 27 million of the 31 million barrels sold in the SPR Drawdown by 2017, which will provide the Nation with sufficient import protection. The remaining funds of $291 million are not required.

Subcommittee. What happens if our economy starts growing more quickly and imports go up again? Or if the price of oil increases and the funds remaining in the Account are not sufficient to repurchase even the 27 million barrels the budget proposes? Shouldn't we wait until we have a better sense of these issues before deciding to use that money for other things?

Secretary Chu. The SPR plans to repurchase oil for the SPR at a time in the future when the oil markets are stabilized and prices will provide a good value to the Government.

SELLING OIL FROM THE STRATEGIC PETROLEUM RESERVE

Subcommittee. On February 14th, the White House Press Secretary was asked about the prospects for possibly tapping the Strategic Petroleum Reserve again to try to bring down rising gas prices. As part of his response, Mr. Carney said, "we never take options off the table." Now, we are all obviously concerned about rising gas prices and the impacts that has on the national economy as well as individual family budgets. But is the Strategic Petroleum Reserve an appropriate tool to use to try to tinker with something as variable as gas prices or should it be used only to address a "severe energy supply interruption" as the law describes?

Secretary Chu. The Energy Policy and Conservation Act (EPCA) (P.L. 94-163, as amended) prescribes the conditions that must exist for the President to order a drawdown and sale from the Strategic Petroleum Reserve. The mission of the Strategic Petroleum Reserve is to address actual or impending supply interruptions and not to manipulate market prices. DOE maintains close contacts with the International Energy Agency (IEA) on this topic and will continue to confer with them on the global oil market impacts of geopolitical events.

KEYSTONE XL GREAT PLAINS OIL PIPELINE EXPANSION

Subcommittee. Rising oil and gasoline prices due to events overseas remind us of the importance of ensuring our nation's access to petroleum resources. At the same time, the administration denied the permit for the expansion of the Keystone pipeline. This pipeline would have brought up to 700,000 barrels of oil per day from Canada into the United States, and would potentially have displaced oil imports from unstable regions.

Given that energy security is one of the Department of Energy's core missions, what is your position on the cancellation of this project?

Secretary Chu. I'm not aware that the project has been cancelled. The project sponsors have re-filed with the State Department for a Presidential Permit with an alternative pipeline route through the State of Nebraska.

Subcommittee. What were the main concerns over the pipeline expansion, and how were those being balanced against the clear benefits to national security and prosperity?

Secretary Chu. As the President stated in January, TransCanada's permit application was denied because of a deadline that prevented the State Department from gathering the information necessary to evaluate the project and protect the American people.

Subcommittee. I understand the State Department had primary jurisdiction over siting the pipeline. Given that this is not their primary expertise, how did your Department support their efforts?

Secretary Chu. The Department of Energy (DOE) provided information concerning the potential impact of the pipeline proposal on U.S. oil imports from Canada and other countries, use of Canadian oil within each of the five Petroleum Administration for Defense Districts (PADDs) and world-wide greenhouse gas emissions.

Subcommittee. Do you expect them to reapply in the future?

Secretary Chu. I understand that TransCanada reapplied to the State Department on May 4, 2012 for a Presidential Permit with an alternative pipeline route.

BIOFUELS AND ELECTRIC VEHICLES

Subcommittee. Mr. Secretary, we all want to improve our energy self-sufficiency. The biggest concern, of course, is our transportation sector's reliance on imported oil. Several companies released electric or electric hybrid vehicles last year, but they were not adopted as quickly as some had hoped. The President put forth a goal of 1 million electric vehicles on the road by 2015, but the latest figures are that only And we're certainly not building power plants quickly enough to provide electricity to a huge number of new electric vehicles.

Does the Department have an articulated strategy to help reduce our country's reliance on imported oil?

Secretary Chu. Reducing our country's reliance on imported oil is an Administration-wide priority. In March 2011, the President set a bold but achievable goal of reducing oil imports by a third in a little over a decade. A large part of the strategy to achieve this goal focuses on technology advance and deployment for both electric vehicles and advanced biofuels. President Obama has shown leadership in promoting electric vehicles, especially in connection with battery development. The Recovery Act, signed by the President in February 2009, included $2.4 billion for battery and electric drive vehicles. In 2009, the U.S. had only two factories manufacturing batteries that power advanced technology vehicles and produced less than two percent of the world's advanced batteries. But over the next few years, the United States will be able to produce enough batteries and components to support 500,000 plug-in and hybrid vehicles and will have the capacity to produce a significant share of the world's advanced batteries. In part because of these strategic Recovery Act investments, battery costs are expected to drop by half (2009-2013). Under the Recovery Act, we are supporting 30 major manufacturing facilities for batteries and components for electric drive vehicles.

To advance biofuels, President Obama set a goal of breaking ground on at least four commercial-scale cellulosic or advanced biorefineries by 2013. That goal has been accomplished, one year ahead of schedule. Together, these projects and associated demonstration and pilot projects will produce a combined total of nearly 100 million gallons per year of advanced biofuels capacity. In addition, EPA's continued implementation of the National Renewable Fuels Standard (RFS) has supported a growing domestic renewable fuels industry. Last year, industry reported production of approximately 14 billion gallons of renewable fuels, about 8% of total U.S. highway vehicle fuel. U.S. biofuel production is at its highest level ever.

Subcommittee. What advances have you made over the last year?

Secretary Chu. We are on track to achieving the President's goal. When President Obama took office, America imported 10 million barrels of oil a day. By the end of last year, that number dropped to 8.4 million barrels per day.

Increasing fuel efficiency is key to reducing our reliance on imported oil, and President Obama has a solid record of leadership in this area. In May 2009, President Obama announced national fuel efficiency standards and greenhouse gas standards for cars and light-duty trucks built in 2012-2016 – the first meaningful update to fuel efficiency standards in decades. In July 2011, the President announced the next phase in the Administration's program to improve the fuel efficiency of light-duty cars and trucks, proposing standards under which average fuel efficiency is expected to nearly double, reaching an average performance equivalent of 54.5 miles per gallon by 2025. This will save consumers roughly $8,200 per vehicle and slash greenhouse gas emissions by 6 billion metric tons over the lifetime of the vehicles covered by these standards. In August 2011, the Administration finalized the first-ever national fuel efficiency and greenhouse gas standards for heavy-duty trucks, vans and buses, spanning model years 2014-2018.

Subcommittee. How many electric vehicles need to be on our roads to make a significant dent in our dependence on imported oil, and by what year could that happen?

Secretary Chu. The President set an ambitious goal to accelerate the United States on a path to independence from petroleum. While the one-million vehicle goal is an important milestone for electric vehicle (EV) market growth, it is not considered the end point. Significant additional market penetration is required to realize the technology's full potential and more wholly address petroleum consumption and greenhouse gas reductions across the nation's vehicle fleet. For example, achieving 20 million EVs on the road by 2025 with a 50/50 mix of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles with a 40-mile all-electric range (PHEV40) would save approximately 250 million barrels of oil per year, which is equivalent to more than 5% of current oil imports. Although several auto companies introduced plug-in electric vehicles last year, nearly every major auto manufacturer has announced plans to introduce new vehicles and models over the next 2-3 years, broadening consumer choices. Significant growth in the very competitive automotive market will take time. As shown by the introduction of other new automotive technologies, it can take 15-20 years for a new technology to fully penetrate the market. A number of consumer research organizations, financial institutions, universities, and national laboratories have published studies projecting EV market penetration rates. As noted in a DOE compendium of such studies, projections vary significantly, but the U.S. EV market could reach 20 million vehicles in the 2020-2030 timeframe.[1]

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[1] Oak Ridge National Laboratory, "A Comparative Study of Emerging Vehicle Technology Assessments," February 2011 (http://info.ornl.gov/sites/publications/Files/Pub27187.pdf).

NUCLEAR ENERGY

VOGTLE NUCLEAR PLANT VOTE AT THE NUCLEAR REGULATORY COMMISSION

Subcommittee. Mr. Secretary, on February 9th the NRC approved the first license for a nuclear power plant in 30 years. We're pleased that the country is moving forward to a more self-reliant, diverse energy supply. I was surprised to see, however, that NRC Jaczko voted against the new plant. In fact, he was the only Commissioner to vote against the plant...and apparently for vague "safety" reasons. Do you have any insight into anything unsafe with the Vogtle plant, or why the Chairman would take such a controversial, isolated stand against this country's power sector?

Secretary Chu. The Department of Energy (DOE) does not have any insight into why NRC Chairman Jaczko voted against the Vogtle license other than what is in the public record. The NRC has approved the Vogtle license affirming that the plant can be safely constructed and operated. DOE has no safety concerns about the Vogtle Units 3 and 4.

SMALL MODULAR REACTOR LICENSING SUPPORT

Subcommittee. Mr. Secretary, the Committee supported your fiscal year 2012 budget proposal to support licensing for small modular reactors, by providing $67 million to jump-start this program, in addition to funding for research into advanced designs.

How do you believe small modular reactors can make a difference in our energy sector and economy?

Secretary Chu. The Department believes that small modular reactors (SMRs) have the potential for adding a new, safe, clean and affordable nuclear energy option to the mix of domestic energy technologies. SMRs offer more flexibility in financing, siting, and end-use applications than large reactors. SMRs may reduce an owner's initial capital outlay due to the anticipated lower capital cost for SMRs and improve cost by reducing construction schedule durations through the use of modular components produced in a factory and transported to the site for assembly. SMRs may be used to provide power for applications where large plants are not needed or where infrastructure to support a large unit is lacking, such as smaller electrical markets, isolated areas, smaller grids, or restricted water or acreage sites. If DOE is successful in helping to establish a domestic and international market for SMRs, the economy stands to benefit through associated domestic job growth, increased manufacturing capacity, and export growth in the nuclear sector.

Subcommittee. What do you see as the biggest risk to the small modular reactor program?

Secretary Chu. There are several risks that DOE needs to be concerned about with this program. Primarily, there is regulatory risk in that these SMR designs have not been licensed in the past. Although the light-water-based SMR designs are similar in principle to the large, 1000 MW nuclear plants that have been and are being certified and licensed, there are differences in structures, components, and operating philosophies that may result in protracted reviews. Non-light-water designs such as gas and liquid metal-cooled reactors may be even more challenging to license due to the lack of extensive design and operational experience with these technologies compared to light-water-based designs. Additional risks are introduced by the fact that deployment of SMRs by industry will be a complex economic decision based on several factors, including the cost of alternative energy options, energy supply diversity and potential GHG policy considerations.

Subcommittee. The budget request reduces funding for this program by $2 million in fiscal year 2013. Is this program adequately funded?

Secretary Chu. The Department has established a 5-year, $452 M funding profile for the SMR Licensing Technical Support program, with the first two years funded at $67 M and $65 M, respectively. Due to the late arrival of the funding in FY 12 and the need to execute a complex process, the Department does not expect to obligate the funding until the end of 2012. However, once the award selections are made, we feel that the funding profile will provide adequate resources to complete certification and licensing for the selected projects, provided the funding in future years is commensurate with the overall funding profile. The DOE Office of Nuclear Energy intends to request the balance of the required program funding ($320 M) in fiscal years FY14-FY16.

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

HYDRAULIC FRACTURING RESEARCH

Subcommittee. In the budget request, the Administration proposes to fund a research effort involving the Department of Energy, the EPA, and the U.S. Geological Survey, aiming to "understand and minimize the potential environmental, health, and safety impacts of shale gas hydraulic fracturing. The Department of Energy proposes to put $12 million of its budget towards this effort.

Secretary Chu, can you describe for the Subcommittee the primary thrust of this new effort? In other words, where do you believe the knowledge gaps are that the Department proposes to fill?

Secretary Chu. On April 13, 2012 DOE, the Environmental Protection Agency, and the Department of the Interior's U.S. Geological Survey signed a Memorandum of Agreement formalizing this Multi-Agency Collaboration on Unconventional Oil and Gas Research. Through this collaboration, a robust Federal R&D plan is being developed, taking into account the recommendations of the Secretary of Energy Advisory Board (SEAB) Natural Gas Subcommitee. DOE's role in this initiative will focus on priorities identified by the interagency collaboration in a research plan to be formed over the next nine months within its area of core research competencies, including wellbore integrity, flow and control; green technologies; and systems engineering, imaging, and materials.

Subcommittee. The budget request indicates that the Secretary of Energy Advisory Board's Shale Gas Subcommittee report's recommendations will guide this program's activities. That report includes 8 or so different recommendations that could involve funding from your Department, ranging from hosting a website providing public information; to research and field studies on methane migration; to federal funding for non-profits like the Ground Water Protection Council. It's unclear from the budget request documents themselves — which of these recommendations does the Department propose to fund?

Secretary Chu. The FY 2013 activities to be funded will focus on a priority collaborative research and development initiative together with the Environmental Protection Agency and the Department of the Interior's U.S.

Geological Survey to address the highest priority challenges associated with the potential environmental, health, and safety impacts of shale gas development.

Subcommittee. And how will industry play a role in the Department's research program?

Secretary Chu. Some research may be conducted at the Department's National Laboratories, and some research may be contracted out to the private sector under competitive solicitations.

CUTS TO FOSSIL ENERGY RESEARCH

Subcommittee. Mr. Secretary, coal accounts for 50 percent electricity, and it's as important as ever to make sure we use that important resource well. The Fossil Energy Research and Development has played an important role to that end, both in improving existing technologies and inventing entirely new ones. I am concerned to see that, while your budget request increases funding for other programs, it cuts funding for this program by $113 million — that's a 21 percent cut.

What is your rationale for reducing funding for research that ensures that we use that vast domestic resource as well as possible?

Secretary Chu. The FY 2013 budget request upholds the President's goals to develop America's innovative competitive edge through strategic clean energy research, development, and demonstration investments, including those in fossil energy. The budget request is well-aligned with the Office of Fossil Energy's (FE) mission of reducing the environmental and safety consequences of development of fossil fuels to meet the United States' energy needs. FE is investing in the key enabling technologies that are on critical paths and that show the highest potential impacts on achieving the program goals and benefits in the timeframe needed for commercial deployment.

Subcommittee. I am doubly concerned about where in Fossil Energy research you propose to take those cuts. While carbon capture and storage programs are kept nearly harmless, the request cuts Advanced Energy Systems by $45 million — nearly in half. It also cuts Crosscutting Research by $19 million — a 40 percent reduction. It seems that we can all agree coal is in our nation's future for many, many decades, and that it is just simply prudent to make sure we use it as efficiently and cleanly as possible.

Why does the Department choose not to make this common-sense investment to improve how we use our coal resources?

Secretary Chu. The mission of the Coal Program's research and development (R&D) activities is to support secure, affordable, and environmentally acceptable near-zero emissions fossil energy technologies. In response to the current fiscal environment, the Department has shifted the focus of the coal program to near-term carbon capture, utilization, and storage (CCUS) technologies that have potential benefits to both existing and new fossil-fueled power plants. The FY 2013 funding request prioritizes research on key near-term capture technologies that can be demonstrated in the 2016 timeframe.

LOAN GUARANTEE PROGRAMS

ADVANCED TECHNOLOGY VEHICLE MANUFACTURING PROGRAM

Subcommittee. Mr. Secretary, in 2008 the Advance Technology Vehicle Manufacturing Program was provided with $7.5 billion to support up to $25 billion in direct loans to manufacturers of advanced technology vehicles and related automotive components. Today, more than two years after this program was first authorized, more than $4.2 billion still remains. On February 16, Chrysler pulled out of the program.

Why did Chrysler pull out?

Secretary Chu. It is Department policy not to discuss specific applications.

Subcommittee. What is the current pipeline of ATVM projects?

Secretary Chu. As of April 10, 2012, the ATVM Loan Program has a total of 26 open document submissions, 17 of which are deemed as Substantially Complete Applications.

Application submissions are first reviewed for completeness, prior to any due diligence being performed. Once a company has provided all the required information, the application is deemed "Substantially Complete" and the review process can begin. An application becoming Substantially Complete does not necessarily indicate that an applicant's business plan, technology, market strategy or financial position are fully viable, or that they will meet all criteria necessary to obtain a DOE loan.

Subcommittee. How much of the appropriated subsidy would you need if all of these projects were actually offered loans?

Secretary Chu. The ATVM Loan Program continues to be an attractive source of funding for automotive manufacturers of vehicles and components, receiving new applications and indications of interest regularly. We are striving to effectively allocate ATVM's remaining credit subsidy to support promising projects consistent with the intent of Sec. 136 of the Energy Independence and Security Act of 2007. However, given the range of completeness of open document submissions and the extended period of time since the last communication between some applicants and DOE, we are unable to estimate a meaningful range of credit subsidy necessary to support the current pipeline of ATVM projects.

Subcommittee. Given that this program was signed into law under "emergency" authority and how slowly it is now progressing, at what point would you consider it appropriate to return the unused funds to the Treasury?

Secretary Chu. The ATVM Loan Program has, as you note, closed five loans totaling over $8.3 billion. The ATVM Loan Program continues to be an attractive source of funding for automotive manufacturers of vehicles and components, receiving new applications and indications of interest regularly. We are striving to effectively allocate ATVM's remaining credit subsidy to support promising projects consistent with the intent of Sec. 136 of the Energy Independence and Security Act of 2007.

USEC LOAN GUARANTEE

Subcommittee. Mr. Secretary, the Department has been unable to approve a full loan guarantee for USEC, although your budget request includes $150 million to help bring its technology to maturity. Are the Department's concerns about the technology, about the company's finances, or about something altogether different?

The Department has made other conditional commitments for loan guarantees. Has this option been considered for USEC? If not, why not?

Secretary Chu. It is Department policy not to discuss specific applications. That said, the Loan Programs clearly lays out the criteria that will be used to analyze applications submitted in response to each solicitation – and DOE applies those criteria on a consistent basis.

FOSSIL ENERGY LOAN GUARANTEES

Subcommittee. Mr. Secretary, you have issued no loan guarantees for fossil fuel plants, even though you have over $8 billion in authority available to you.

How many applications have you received?

Secretary Chu. The Department has received eight applications.

Subcommittee. What's holding up this program?

Secretary Chu. The Department recognizes the importance of advanced fossil projects and is actively working with applicants. Each of these projects has a number of open items that need to be resolved before DOE can evaluate the strength of each application, and determine, as is required by statute, that there exists "a reasonable prospect of repayment of the principal and interest on the obligation by the borrower." Some of these issues involve local and state legislatures or other governing bodies, on which the Loan Programs cannot force a timetable.

FOLLOW-UP TO ALLISON REPORT RECOMMENDATIONS

Subcommittee. Mr. Secretary, I thought the report written by Herb Allison's team on the loan guarantee program was pretty good, given the limited time and mandate he had to work within. I'd like to ask you about a few of his recommendations.

One of these recommendations was to create independent risk management by creating a Chief Risk Officer housing all DOE functions dedicated to monitoring the loan programs. Do you have any plans to develop such a position?

Many, including the Congressional Budget Office, apparently do not think the Department's risk evaluation process is robust enough, so Congress has set aside an additional 1 percent of your loan guarantee authority as an additional protection. What do you think? Do you think the Department has appropriately evaluated the risk of its current portfolio under its old structure?

Secretary Chu. Former Assistant Secretary of the Treasury Herbert Allison evaluated both the monitoring efforts of the Loan Programs Office and its portfolio. As part of this effort, he and his team reviewed each active loan in the portfolio. They looked at the risk factors behind each loan and estimated the costs of each loan. Mr. Allison's report concluded that the Department is using the appropriate risk factors in assessing each loan. In some cases, the report recommended minor differences in the weights given to each factor.

The Federal Credit Reform Act defines the cost of these loan programs as the estimated long-term cost to the government, including the risk of default net of recoveries; for each loan, the subsidy estimate can be thought of as similar to a loan loss reserve. Congress appropriated $10 billion in credit subsidy under the Federal Credit Reform Act for Title XVII and the Advanced Vehicle Loan Programs. Not all of the appropriated credit subsidy has been obligated.

While the portfolio includes loans to a range of projects that carry different levels of risk, the report finds that the Department of Energy has reasonably estimated the costs of these risks. In fact, Mr. Allison estimates that the estimated long-term cost of the outstanding portfolio is $2.7 billion, roughly $200 million lower than Department's most recent estimate.

With regards to his suggestion to create a position of Chief Risk Officer, the LPO had already contemplated and attempted to fill a similar position last year. They are now refining the scope of that original effort and will work to fill the position with an appropriate highly qualified candidate as quickly as possible.

YUCCA TERMINATION

DC CIRCUIT COURT LAWSUIT CONTINUES

Subcommittee. Mr. Secretary, the D.C. Circuit Court will hear further arguments in the case against the NRC in May. In other words, in contrast to the Administration's flagrant disregard of the law, this issue is not dead. If the Court orders the NRC to open the application process up, how much would it cost the Department to stand up the necessary team to support the application?

Secretary Chu. If ordered to do so and provided adequate funds are available, the Department will assemble the necessary team to recommence licensing proceedings before the Nuclear Regulatory Commission. In FY 2010, the last year in which Congress appropriated funds to support the licensing proceeding for a repository at Yucca Mountain, the Administration's budget request for the Office of Civilian Radioactive Waste Management was for $196,800,000. Accordingly, while exact projections for the cost of potential future licensing activities are not available, the Department estimates it is reasonable to expect the cost of recommencing licensing activities could be comparable in the first year and possibly more once the hearing process began.

INTERNAL WORKING GROUP ON NUCLEAR WASTE STRATEGY

Subcommittee. Secretary Chu, two weeks ago, you announced the formation of an internal working group to assess the Blue Ribbon Commission's recommendations on nuclear waste, and to develop a strategy for moving forward.

When will this working group make its recommendations to you? And when will you in turn make your proposal to the Congress — if you will in fact do that?

Secretary Chu. As you know, I directed that a departmental detailed review be undertaken of the Blue Ribbon Commission's ("Commission's") recommendations. The purpose for this internal process is to ensure that they are executed within a comprehensive strategy for the management and disposition of the nation's commercial and defense nuclear materials. This review is organized and well underway. The review includes all programs and staff offices that have a stake in the outcome. The results of this review will inform and underpin my thinking, and that of the Administration, as to the best national path forward for the management and disposition of the nation's commercial and defense nuclear materials. The Departmental review and the development of the Administration's position on an integrated strategy is targeted for completion by the end of July. This timing conforms to Congress's request that the Administration communicate its strategy within six months of the release of the Commission's report.

Subcommittee. In the past several years, this Committee and the Congress have directed the Blue Ribbon Commission to consider all alternatives, including Yucca Mountain. In response, you have insisted that the Blue Ribbon Commission was not a siting commission — in other words, the Commission would have nothing to say either way about Yucca Mountain. Considering that this new working group will need to develop specific, concrete recommendations, will it consider all alternatives, including Yucca Mountain?

Secretary Chu. Consent-based siting is one of the core considerations for the Department's working group. The Commission took the view that "...this question ultimately has to be answered by a potential host jurisdiction, using whatever means and timing it sees fit...." The Commission also believed that "...a good gauge of consent would be the

willingness of affected units of government – the host states, tribes, and local communities – to enter into legally binding agreements with the facility operator…."
The departmental working group is exploring whether these considerations should be accounted for in either legislation or siting guidance, or whether the nation's interests will be best served by deferring matters of siting to the future nuclear materials management and disposition organization that will be derived out of the Administration's and Congress' deliberations on this matter.

Finally, Yucca Mountain represents a useful case example under consideration in this review process as relates to "consent-based siting." Communication has been received from Nye County NV consenting to an interim storage facility or repository; and a letter has subsequently been received from the Nevada Governor in which he states that "There should be no uncertainty or misunderstanding of my position…the State of Nevada does not support the location of …[an interim spent fuel storage site or repository site] in Nevada. "

Subcommittee. The current law of the land is for waste disposal at Yucca Mountain. The Blue Ribbon Commission considered interim storage, waste disposal, and other aspects of waste management. What sort of recommendations will this working group make? How specific will they be, and how wide-ranging?

Secretary Chu. The Department's working group is reviewing the Commission's recommendations at a more detailed level to, in particular, assess how they might best be implemented and to ensure that they are executed within a comprehensive strategy for the management and disposition of the nation's commercial and defense nuclear materials. Should the recommendations, for example, be accounted for in detail in legislation or would enabling guidance be the best vehicle? In this sense, the Commission's recommendations provide the framework within which the Department's and Administration's review is being undertaken. The Commission, for example, believes that "…a congressionally chartered federal corporation [GOVCORP] offers the best [single-purpose organizational] model." The Department's working group is identifying the range of possible GOVCORP options and will provide assessments of each for policy maker consideration.

Subcommittee. The Blue Ribbon Commission did not consider any fuel cycles other than our current "once-through" approach. Can you develop a strategic proposal without considering this angle?

Secretary Chu. As addressed in its Report, a central question for the Commission was "...whether any currently available reactor and fuel cycle technologies, or any not-yet commercial technologies that are now under development, have the potential to change either the fundamental nature of the nuclear waste management challenge...or the approach the United States should take to implement a strategy for the storage and ultimate disposition of SNF and high-level radioactive waste." The Commission concluded that while new reactor and fuel cycle technologies may hold promise for achieving substantial benefits in terms of broadly held safety, economic, environmental, and energy security goals and therefore merit continued public and private R&D investment, no currently available or reasonably foreseeable reactor and fuel cycle technology developments—including advances in reprocessing and recycling technologies—have the potential to fundamentally alter the waste management challenge this nation confronts over at least the next several decades, if not longer." The Department's review, in light of this finding, does not include spent nuclear fuel reprocessing or recycling as a system design requirement for a nuclear materials management and disposition system.

The Commission, however, also concluded that "...it is premature at this point for the United States to commit irreversibly to any particular fuel cycle as a matter of government policy given the large uncertainties that exist about the merits and commercial viability of different fuel cycles and technology options." In this context, the Commission notes that "...there is a benefit to preserving and developing options so that the nuclear waste management program and the larger nuclear energy system can adapt effectively to changing conditions...." and recommends preserving and developing those options, by continuing to fund RD&D on a range of reactor and fuel cycle technologies that have the potential to deliver societal benefits at different times in the future.

SCIENCE

FUSION ENERGY SCIENCES AND ITER

Subcommittee. Mr. Secretary, your budget makes some priority decisions within the Office of Science, some of which are praiseworthy, and some of which I fear may be short-sighted. The request increases several programs substantially, but reduces funding for fusion energy research by $2 million. By doing this, your request reduces our nation's planned contribution to ITER, the international fusion experiment, to $150 million from the planned $200 million. As you can imagine, this has created concern among our partner countries. At the same time, you've also crunched the domestic fusion program by roughly $50 million as well.

What is your intention regarding ITER? Does this request indicate flagging support for ITER as a whole?

Secretary Chu. The request for ITER is a significant increase over the FY 2012 funding level and reflects the Administration continued commitment to the scientific mission of ITER, while maintaining a balanced research portfolio. We are working with our ITER partners to accomplish this goal. We have already begun reaching out to our partners on developing a strategy to move forward with ITER in a manner consistent with sound fiscal policy. We anticipate that future requests for ITER will continue to keep the project on schedule and will not exceed ~$200-225 million.

Subcommittee. I understand that the $150 million for ITER, and the even higher levels planned in future years, is a lot to spend on a project hosted overseas. To give us context, how much of funding we contribute to ITER goes to American companies and researchers?

Secretary Chu. The U.S. contributions to the ITER Project consist of in-kind hardware components, U.S. program personnel, and funding to the ITER Organization for the ITER construction phase in accordance with the terms of the ITER Joint Implementation Agreement. Approximately 85% of the U.S. funding for ITER will be spent in the U.S. The remaining 15% will support ITER assembly and the ITER organization (including onsite U.S. personnel). In addition, other ITER members have placed procurement contracts with U.S. industries totaling over $58M and have placed procurement contracts with Department national laboratories totaling $46M. Additional contracts are being negotiated.

Subcommittee. Even while you give across-the-board increases to other programs, this proposal could seriously hamper our domestic fusion community — currently a world-leading community, I might add. What do you see as the future of our domestic fusion science and technology community, and how could it survive with the budget you propose?

Secretary Chu. The proposed budget was developed with a long-term vision for the entire Fusion Energy Sciences FES program. It positions the program to maximize the scientific return of our investment in ITER; address gaps in materials science required for harnessing fusion energy; continue to steward the broader plasma sciences, taking advantage of cross-agency synergies; and provide opportunities for U.S. scientists to do research on a billion-dollar-class of new international superconducting facilities. Although the proposed budget will present challenges, it will allow the U.S. to continue to have a dynamic domestic fusion program.

Subcommittee. You have said that you are putting funding to Science programs that can realize more near-term advances in the energy sector. But aren't you short-changing future generations by not investing in an area like fusion research? And isn't this precisely the proper role of government — to fund long-term research that the private sector would never do but could change our world in three, four, or five decades?

Secretary Chu. With the proposed budget request, the U.S. continues to have a strong investment in fusion research. The U.S. is a partner in the ITER Project, which is designed to be the first magnetic fusion facility to achieve self-sustaining ("burning") plasmas and that will open a new era in fusion energy science. The proposed budget will sustain a viable domestic U.S. program that will continue to make significant contributions to resolving vital issues in fusion research and thereby contribute to building the scientific foundation needed to develop a future fusion energy source.

CUTTING SCIENCE PROJECTS TO MAKE ROOM FOR GENERAL INCREASES

Subcommittee. Secretary Chu, your Science budget request has made quite a splash for a couple of reasons. In particular, the request makes some tough decisions and hard stances by first, cutting the expected donation to ITER, the international fusion project, by $50 million. Second, it cuts our domestic fusion program by about $50 million. Third, it defers construction funding for the Facility for Rare Isotope Beams to future years while the Department reviews all Nuclear Physics projects and how they will fit within future-year budgets.

We could argue about the merits of each of these projects, but these seem like hard and necessary decisions that responsible financial stewards have to make. That is, that would be the case if the Department hadn't also requested, in the same budget, a $106 million increase for another science program, Basic Energy Sciences. What's more, that increase is not to accommodate any expected program or project cost, but is instead an across-the-board increase to most ongoing programs.

Mr. Secretary, how do you justify putting such a squeeze on these ongoing projects and programs when you do so primarily for a general increase in funding to one program?

Secretary Chu. The $4.99 billion FY 2013 request for SC represents a strong commitment by the Administration to maintain our Nation's investments in science and innovation. The Administration made many difficult decisions while maintaining substantial investments in each of the six core research programs. Despite a challenging budget environment for Nuclear Physics with significant reductions across the program, the President's request includes $22 million for the Facility for Rare Isotope Beams at Michigan State University. This will allow the project to continue to move forward in engineering and design.

In Fusion Energy Sciences, the Administration is committed to the scientific mission of ITER, an international fusion experiment involving six nations and the European Union. ITER aims to produce the world's first "burning plasma," a self-sustained positive net-energy thermonuclear reaction. The Joint Implementing Agreement calls for all Members to provide in-kind contributions to ITER, and about 85% of our ITER funding will be spent in the United States for items including in-kind equipment that will be built in the U.S., R&D, and U.S. ITER project personnel. In order to support the increase in ITER funding, we had to make several difficult, even painful, decisions in the rest of the U.S. domestic program, including closing the Alcator C-Mod tokamak at MIT.

The $106 million increase requested in the Basic Energy Sciences (BES) program reflects the Administration's judgment that there is exceptional potential for science to seed new breakthroughs in clean energy. The BES increase is specifically targeted in three areas:

- A joint research and development effort with EERE, aimed at accelerating the transition of novel scientific discoveries into innovative prototype clean energy technologies leveraging the existing investments in clean energy sciences at EFRCs and BES user facilities ($35 million).
- New core fundamental scientific research efforts to pursue science-based chemical and materials design and manufacturing through an understanding of the correlations between material structure, chemistry, and function for clean energy applications ($42 million).
- New core fundamental scientific research efforts in the areas of Materials and Chemistry by Design, with the specific goal to provide the Nation with a science-based computational tool-set to rationally predict and design materials and chemical processes to gain a global competitive edge in scientific discovery and innovation ($20 million)

Subcommittee. What is different this year that leads you to deviate so suddenly from these programs' expected paths? Couldn't you have seen this coming?

Secretary Chu. The decisions in Fusion Energy Sciences, Nuclear Physics, and other areas were not made lightly. The Administration's request reflects the realities of balancing numerous competing multi-year budget priorities and meeting the requirements of the Budget Control Act of 2011.

ADVANCED RESEARCH PROJECTS AGENCY - ENERGY (ARPA-E)

ARPA-E PROMISE

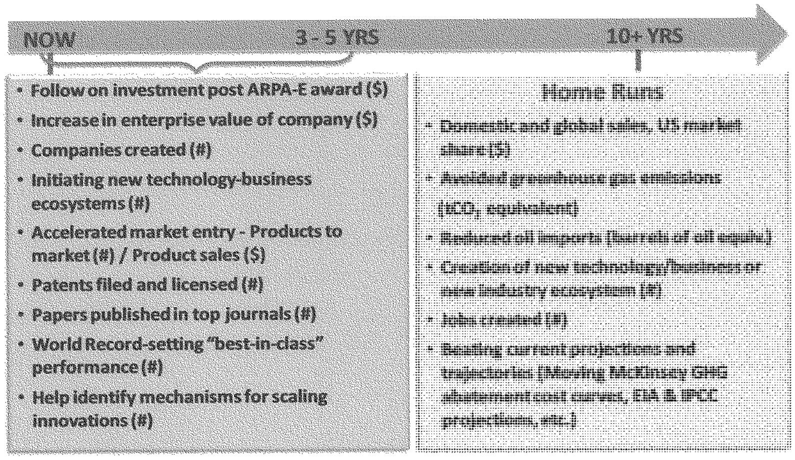
Subcommittee. Mr. Secretary, this budget request asks for $350 million for ARPA-E. As we sit here today, the ARPA-E Summit is underway not too far from this room. One reason this program has received support is that it promises a new way for stimulating energy innovation, without, supposedly, competing directly with the private sector. Also, it is built in such a way that projects that aren't performing can be terminated, ensuring more accountability of taxpayer dollars.

What is your assessment of the performance of the program to date? What metrics are you using?

Secretary Chu. ARPA-E will be a success if it enhances the economic and energy security of the United States in a manner that reduces energy imports; energy-related emissions, including greenhouse gases, and improves energy efficiency and it ensures that the United States maintains a technological lead in developing and deploying advanced energy technologies. ARPA-E focuses on high-impact energy technology research, with an expectation that a substantial percentage of our projects will fail.

There are different metrics of success for different time scales. For example, if the supported technologies are techno-business "home runs", it could still take more than 10 years beyond a successful ARPA-E project to scale the technology in cost and volume for broad deployment. ARPA-E would be pleased if 10-15% of the projects become such "home runs." In the next 3-5 years, we can only look for indicators of this future success.

The following table shows examples of the types of metrics that might be useful on short- and long-term scales. This table is shown as an example and is not intended to be a comprehensive sample of the types of metrics ARPA-E is using.



- Follow on investment post ARPA-E award ($)
- Increase in enterprise value of company ($)
- Companies created (#)
- Initiating new technology-business ecosystems (#)
- Accelerated market entry - Products to market (#) / Product sales ($)
- Patents filed and licensed (#)
- Papers published in top journals (#)
- World Record-setting "best-in-class" performance (#)
- Help identify mechanisms for scaling innovations (#)

Home Runs

- Domestic and global sales, US market share ($)
- Avoided greenhouse gas emissions (tCO_2 equivalent)
- Reduced oil imports (barrels of oil equiv.)
- Creation of new technology/business or new industry ecosystem (#)
- Jobs created (#)
- Beating current projections and trajectories (Moving McKinsey GHG abatement cost curves, EIA & IPCC projections, etc.)

Subcommittee. Have you terminated any projects so far? Why?

Secretary Chu. ARPA-E supports research that "swings for the fences" – ARPA-E awardees are competitively selected to conduct challenging research based on aggressive milestones/deliverables ("milestones"). By their very nature, these aggressive research milestones will often not "pan out" despite the best efforts of recipients. ARPA-E actively manages these research efforts by requiring quarterly progress reports, and conducting regular site visits.

As of February 12, 2012, six ARPA-E awards have been discontinued by mutual agreement for inability to meet milestones. Each recipient was provided formal notice of the unmet milestone(s) and opportunity to correct the situation in hopes that the research will get "back on track." If the awardee was unable to do so, a notice of intent to suspend the research award was sent to the recipient. In the end, ARPA-E and the six recipients reached amicable determinations to discontinue the research projects and focus efforts elsewhere on more promising initiatives.

Each awardee was specifically informed by ARPA-E that "ARPA-E, recognizes and appreciates the effort that the team at [awardee] made to demonstrate [specific technical target] … in this high-risk, high-reward

ARPA-E project. ARPA-E welcomes the participation of [awardee] on future projects related to disruptive energy technologies."

ARPA-E continues to rigorously monitor current recipients' performance and will discontinue awards that are not meeting milestones.

The six discontinued projects and relevant information:

Performer Name	Project Title	Discontinuation Date	Amount De-Obligated
Material Methods	Phononic Heat Pump	21-Sep-11	$198,837
NanOasis Technologies, Inc	Carbon Nanotube Membrane Elements for Energy Efficient and Low Cost Reverse Osmosis	14-Oct-11	$290,900
Inorganic Specialists	Silicon Coated Nanofiber Paper as a Lithium-Ion Anode	3-Nov-11	$358,529
Nalco Company	Energy Efficient Capture of CO_2 from Coal Flue Gas	12-Oct-10	$500,000
Iowa State University	A Genetically Tractable Microalgal Platform for Advanced Biofuel Production	10-Nov-11	$1,906,272
United Technologies Research Center	CO_2 Capture with Enzyme Synthetic Analogue	9-Jan-12	$403,898

Total	$3,658,436

Subcommittee. How do you ensure that ARPA-E does not compete with private sector investments?

Secretary Chu. ARPA-E's mandate is to accelerate "transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty." In accordance with its statutory mandate, ARPA-E makes investments in transformational and disruptive energy technologies that private investors are not likely to fund at their present stage of development. The Government Accountability Office's (GAO's) January 2012 report entitled, "Advanced Research Projects Agency-Energy Could Benefit from Information on Applicants' Prior Funding" largely confirmed that ARPA-E was complementing and not replacing private sector investment, stating in part, "GAO's review suggests that most ARPA-E projects could not have been funded solely by private investors."[2]

Before announcing a new program, ARPA-E undertakes a comprehensive process to identify a technology "white space" that is not likely being addressed by the private sector or other Federal Agencies. ARPA-E technical staff begin by reviewing the scientific literature to identify potential program areas. Next, ARPA-E technical staff examine the current state of the art, the main players in the space, and the major technology challenges. If ARPA-E concludes that a technology white space exists, ARPA-E technical staff organize a workshop, bringing in relevant stakeholders from industry, academia, and government to further refine the concept for a potential program. If the workshop indicates there is potential for ARPA-E to have an impact, ARPA-E may issue a funding solicitation containing market-based cost and performance metrics that, if achieved, would displace the prevailing technology.

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[2] Office of Government Accountability, Advanced Research Projects Agency-Energy Could Benefit from Information on Applicants' Prior Funding (2012, available from: http://www.gao.gov/assets/590/587667.pdf), highlights page.

Applicants are required to disclose in their applications whether they submitted the same or similar concepts to ARPA-E, other Federal agencies, or private investors. In addition, applicants are required to disclose prior and current sources of funding for the proposed research project and related work. Finally, applicants are required to provide a detailed explanation for lack of support from existing sources of funding. For example, large businesses are required to explain why the proposed project is not being sponsored internally.

During the merit review process, ARPA-E utilizes expert reviewers from industry, academia, and government to rate and provide comments on applications. These reviewers help ARPA-E to avoid any with projects funded by other Federal agencies and private investors.

Upon the execution of the funding agreement, ARPA-E invites industry representatives to participate in its meetings with recipients. These meetings enable a free exchange of ideas and encourage collaboration with potential commercialization partners.

ARPA-E recipients are required to disclose in their quarterly performance reports any new funding received from public or private sources. This ensures transparency and enables ARPA-E to make appropriate funding determinations.

PROPOSED ARPA-E INCREASE

Subcommittee. Mr. Secretary, the fiscal year 2012 appropriation provided $275 million for the Advanced Research Projects Agency—Energy (which is referred to as ARPA-E). The budget request proposes to increase funding for ARPA-E by nearly 28%.

Now, ARPA-E has potential to advance American innovations and competitiveness, and its management team has certainly worked hard to get the program going. But the idea of ARPA-E is not without controversy. At the very least, we must be mindful that it is a completely new research model in only its third year of operation. With only three years under its belt, few if any of its projects have been fully completed.

Secretary Chu, Given that ARPA-E is still new and we simply do not yet know how successful it will be, how do you justify a 28 percent increase in funding for ARPA-E — especially when many other important programs are cut?

Secretary Chu. ARPA-E is part of the Department of Energy's efforts to accelerate the pace of innovation. ARPA-E fulfills a critical need for transformational energy technologies. But transformations do not happen overnight – it will take at least 10-15 years to scale these technologies in cost and volume and indeed change the world.

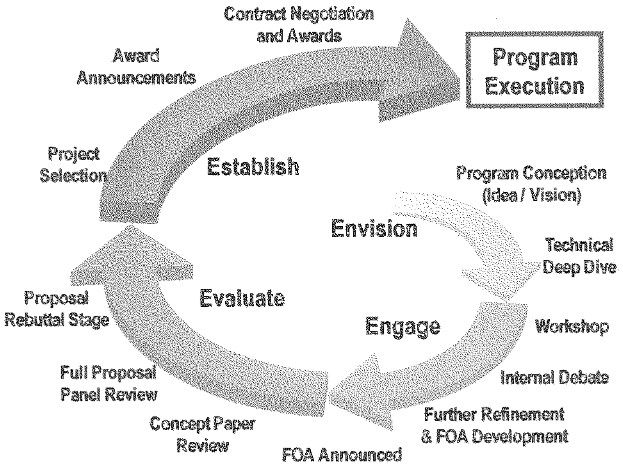
In the next 3-5 years, ARPA-E can only look for indicators of success: (1) Are we attracting world-class minds to energy research? Are we getting the best ideas? (2) How many small businesses have been created? (3) Do we have the world's best performance in a technology? (4) How many patents have been filed and licensed? (5) If ARPA-E's funding has created value, how much follow-on funding has the private sector made?

ARPA-E is seeing some initial early signs of success. 11 of some of ARPA-E's first projects that received $40 million from ARPA-E produced breakthroughs that generated more than $200 million in private sector investment. ARPA-E's initial funding allowed these innovators to do the research and overcome technical barriers, ahead of schedule. Through the work funded by ARPA-E, the projects were able to lower the risk and demonstrate results. While ARPA-E is still in the early stages, these are good signs for future success.

On February 27, 2012, one of ARPA-E's awardees, Envia Inc., announced the world's highest energy density of rechargeable battery at 400 Whr/kg, which is double of today's state-of-the-art rechargeable lithium ion batteries. For an all-electric or a hybrid-electric vehicle, doubling the energy density reduces the battery cost by half, and Envia is trying to reduce the cost even further. While Envia still has to show manufacturability, cycle and calendar life for these batteries, ARPA-E's investment enabled Envia to make the first demonstration of the world record setting technology.

In addition to Envia, there have been several other "firsts" that ARPA-E funded research teams have accomplished: (b) first silicon carbide based single transistor that can handle 1 MW of electrical power, which is at the heart of future electrical power devices for a modernized grid; (c) first lithium-ion based flow battery that can be used for low-cost grid-scale electricity storage. These and many other innovative projects offer great promise for ARPA-E to meet its statutory goals.

ARPA-E implemented a novel process for the development and creation of programs that features extensive technical community engagement, topical workshops, a three-stage peer review process that allows for rebuttals to reviewer comments, and rapid contract negotiation, as shown in the figure below.



Timeline: 6-8 Months from Program Conception to Execution

Despite its depth of engagement and multi-stage evaluation, this model affords a timeline from conception to execution that is greatly accelerated—typically only six to eight months. This allows ARPA-E to respond rapidly to newly emerging technological discoveries and geopolitical events in its creation of new programs.

ARPA-E prides itself on constant innovation, both in the technologies it seeks to its own business practices. ARPA-E's embedded dedicated legal and procurement teams allows it to achieve an unprecedented pace of transferring awards from announcement to signing cooperative agreements—usually about two to three months—a pace that is uncommon in the public sector. This speed and efficiency of process has been instrumental to ARPA-E's success and reputation.

ARPA-E is well-equipped to handle an increase in funding. ARPA-E successfully responded to the challenge of awarding Recovery Act funds in just 17 months – with only a fraction of current staffing levels – through the creation of a novel process, careful resource allocation, and the efforts of a bright, determined team. The current, expanded ARPA-E team, with its previous experience of creating and managing the seven existing programs, awarding and obligating the Recovery Act funds, and establishing policies and practices, intends to obligate and award the entire FY2013 appropriated amount on schedule.

Subcommittee. These examples of follow-on venture capital funding for ARPA-E projects are surely what we'd like to see — as long as we can ensure that these projects would not have received that same venture funding if they had not gotten support from ARPA-E. But more importantly, we're only talking about a small handful of ARPA-E projects so far. And so I'd like to ask some more pointed questions:

How many ARPA-E grant recipients have fully completed their 3-year ARPA-E project?

Secretary Chu. As of April 3, 2012, seven ARPA-E projects have been successfully completed and closed. It is important to note that not all of ARPA-E's projects last for three years.

Subcommittee. If we ignore the very small handful of projects that have gotten follow-on funding, how do you know if these projects are successful if they are not finished yet?

As I mentioned before, ARPA-E has potential. But we do not yet know if that potential will be realized, it's just too early to tell. And when funding is hard to come by—and you can be sure that it will be this year—the Department must justify these proposed increases.

Secretary Chu. ARPA-E funds high-risk ideas in which the private sector is unlikely to invest. These risks include both technology and market risks. Furthermore, ARPA-E funds multiple competitive and parallel approaches to reach the same performance and cost target of technology, and after the technology is de-risked, then let the private sector pick the ones that are best for business. The results are technology options for the Nation and some internal competition within the Nation, both of which are very important for innovation and U.S. technological lead in the world. The returns for this investment are long-term economic growth and security for our nation by the creation of industries that do not exist today. This is a very different model than venture capital investment. Upon selection of a recipient for award, we work with the recipient to establish a set of technical milestones and deliverables for each quarter and year. ARPA-E focuses on high-impact energy technology research, so our technical milestones and deliverables are very aggressive. A successful project is one that meets the technical milestones and deliverables over the course of the award period. We set the bar high and build into our funding agreements milestones and deliverables that, if met, would not only overcome a specific technical barrier, but also allow a technology to attract future private investment and make progress towards the market.

ADDITIONAL MEMBER QUESTIONS

QUESTIONS FROM CHAIRMAN FRELINGHUYSEN OF NEW JERSEY

KEEPING MANUFACTURING JOBS IN THE UNITED STATES

Chairman Frelinghuysen. This subcommittee has long supported the Department's efforts to keep the world's best science and engineering workforce here at home, and to keep our position as the world's top innovator. But we also need to think one step further by making sure we don't just invent the newest technologies, but that we then manufacture them in the United States. After all, devoting federal funding to support a research team of 10 people here at home just so a company can support 1000 manufacturing jobs overseas misses the mark.

Secretary Chu, beyond the Advanced Manufacturing program your budget proposes, how are you working to ensure that federally-funded research and development conducted at American universities, labs, and companies then leads to manufacturing and jobs here in the United States?

Secretary Chu. As you know, maintaining and continuing to build manufacturing jobs in the United States is a priority for the Administration, and clean energy plays an important role in building domestic manufacturing. The Administration is pursuing an additional $5 billion in support for the Section 48C program, which, by providing a 30% tax credit for energy manufacturing facilities will continue to help build a robust high-technology, U.S manufacturing capacity to supply clean energy projects with U.S. made parts and equipment. The Section 1603 tax grant program has created tens of thousands of jobs in industries such as wind and solar by providing up-front incentives to thousands of projects. The Administration is seeking a one-year extension of this program.

CONFLICTS OF INTEREST IN ADMINISTRATION STAFF

Chairman Frelinghuysen. A Washington Post article published on February 14 highlighted the prevalence of staff and advisors in your agency coming from investment companies whose ventures were funded by the agency's programs, or who raised significant funds for the Obama campaign. These allegations are very troubling — both ethically, and in the effort to protect the taxpayers' money.

Let me start by asking, Mr. Secretary, do you believe there were any conflicts of interest among staff, advisors, or advisory board members who influenced the Department's funding decisions?

Secretary Chu. No. The Department's funding decisions are made on the merits, after careful review by our program experts in order to fulfill the objectives set forth by Congress and maximize protections for the taxpayer. The individuals named in the Washington Post article are all professionals with expertise in clean-energy science, finance or both.

In addition, employees who join the Department are subject to conflict of interest clearance procedures carried out by the Department's Designated Agency Ethics Official, a career employee whose office advises all employees of the conflict of interest and other ethics regulations and provides individual guidance as needed on a case-by-case basis.

Let's take another example. The Post reported that one advisor overseeing billions of clean-tech Recovery Act grants worked at a clean-tech venture capital firm directly before joining the Department. According to the article, the agency then provided $2.4 billion to companies in which this advisor's firm had invested. I should point out that this is just one of many examples of advisors with ties to recipients of DOE support.

The specific employee identified in the Washington Post article was given appropriate ethics advice. The Department has no evidence that the employee acted contrary to that ethics advice.

Chairman Frelinghuysen. I'd like to cite a few examples from the loan guarantee program to use as case studies. First, the spouse of an advisor in the loan program office worked at a firm whose clients received an estimated $2.75 billion in Department grants and financing. In a case like this, how did you ensure there was no improper influence of funding decisions?

Secretary Chu. The Department takes the issue of conflicts of interest very seriously. In all matters, we comply with 5 C.F.R. Section 2635.502, which requires that "[w]here an employee knows that a particular matter involving specific parties is likely to have a direct and predictable effect on the financial interest of a member of his household, or knows that a person with whom he has a covered relationship is or represents a party to such matter, and where the employee determines that the circumstances would cause a reasonable person with knowledge of the relevant facts to question his impartiality in the matter, the employee should not participate in the matter unless he has informed the agency designee of the appearance problem and received authorization from the agency designee…".

With regards to the example you cite, the advisor you mention was not in the Loan Programs Office. He played no role in the decision-making on or evaluation of individual loan applications or the awarding of any grants. While the advisor's wife worked at a law firm that represented Solyndra during the closing of their loan application, the firm has publicly stated that she had no role in any firm business involving Solyndra or any other client matters involving the Energy Department while the advisor was at DOE. However, because his wife was a partner in a law firm that was involved in the matter at issue, DOE determined that, under 5 C.F.R. Section 2635.502 (cited above), the advisor was specifically prohibited from participating in the matter.

Chairman Frelinghuysen. Even if "officially" the staff and advisory boards making decisions did not have direct conflicts of interested, I'm equally concerned about how informal discussions and emails involving staff with conflicts of interest may have influenced funding decisions. In this example, this Department advisor's spouse worked at a firm who represented Solyndra — a now-defunct company we've all heard much about. Despite this conflict of interest, however, this advisor sent internal emails urging DOE career staff to resolve delays in awarding Solyndra's loan. Was this a failure of your safeguard process?

Secretary Chu. No, it was not a failure. This particular advisor worked on the Recovery Act team and was interested in ensuring that all Recovery Act funds were put to work in the manner Congress intended – to stimulate the economy and create jobs. The Loan Programs Office ensured that those funds were only distributed once they could ensure that taxpayers were appropriately protected. While in some instances his efforts may have included asking transaction teams to be more efficient and timely in their decision making during the interagency process, in no way did these actions imply he rushed the process or influenced LPO's recommendations. More importantly, the final decision to award a loan guarantee was mine as the Secretary of Energy, and he did not influence my thinking on that or any other transaction in any way.

Chairman Frelinghuysen. Let's take another example. The Post reported that one advisor overseeing billions of clean-tech Recovery Act grants worked at a clean-tech venture capital firm directly before joining the Department. According to the article, the agency then provided $2.4 billion to companies in which this advisor's firm had invested. I should point out that this is just one of many examples of advisors with ties to recipients of DOE support.

Secretary Chu. The line of inquiry in the referenced article is misleading. Attracting highly qualified candidates from the private sector with specialized skills is often crucial to the success of many government programs. By definition, venture capital firms that are focused on technology diversify risk by taking positions in many similar companies. The most successful firms are large and have very broad holdings.

However, that does not mean the individual had any say in where monies were directed, or had any economic interest in ensuring monies went one place or another. In this instance, as with all others, DOE complied with 5 C.F.R. Section 2635.502 (cited above) and conflicted individuals did not work on or have any decision making ability with respect to matters in which a conflict could be perceived, particularly with former employers.

Chairman Frelinghuysen. Now, I understand the importance of having folks at the Department who understand deeply energy technologies and the private sector. But how do you, Mr. Secretary, prevent cases like this where there is clearly the risk for conflicts of interest that put taxpayer dollars at risk?

Secretary Chu. The Department of Energy expects all of its employees to strictly follow every applicable ethics statute and regulation. To that end, the Department relies on its Designated Agency Ethics Official, a career employee, to advise employees with regard to potential conflicts of interests and provide appropriate advice.

SOLYNDRA AND OTHER 1705 LOAN GUARANTEE RECIPIENTS

Chairman Frelinghuysen. Mr. Secretary, last year this subcommittee asked some hard questions about the 1705 ARRA-funded loan guarantee program. We had concerns about whether taxpayer dollars were well used in this program, especially since other clean technologies such as nuclear and clean coal must pay all their application costs. In retrospect, given the fall of Solyndra and other recipients in the intervening year, our concern was well warranted.

Your authority to approve new loan guarantees under this program expired at the end of last fiscal year, yet more than $550 million remains unobligated at this point.

While it is "emergency" funding, rescinding it would still offset our growing federal debt. Why have you not proposed this funding for rescission? What impact would rescinding this funding have on any ongoing programs?

Secretary Chu. The President's FY2013 Budget assumes that the unobligated balances remain unobligated, and therefore do not outlay, over the ten-year budget window. Rescinding these funds would not result in deficit reduction. Many of the projects funded under 1705 are either still in construction or have yet to begin drawing on their loans. It is possible that DOE will determine that it needs to modify the terms of some of their loan documents in the best interests of the U.S. taxpayer. Such modifications may require additional credit subsidy.

Chairman Frelinghuysen. In the waning months of the program's authority, your Department approved billions of dollars of new loan guarantees. What changes did you make between these new guarantees and the failures the program experienced over the last year to ensure taxpayers don't lose hundreds of millions more?

Secretary Chu. The Department is committed to ensuring that the Loan Programs has the resources needed to process and review applications as efficiently and effectively as possible. To that end, the Loan Programs has made a number of improvements since its inception, including:

- We increased our staff and are now able to process applications more efficiently and effectively. As recently as January 2009, the loan programs had only 16 federal employees. Through aggressive recruitment efforts, we now have approximately 85 federal employees supported by a similar number of subject-matter experts engaged on a contract basis.

- We created a new online portal for completing and submitting applications electronically, which has both improved the quality of applications and shortened the amount of time that it takes to complete and process them. It used to take DOE upwards of 3 months to complete the initial review of an application. We can now complete that review in less than two weeks.
- We developed a model for issuing more targeted and understandable solicitations for applications, as exemplified by our manufacturing solicitation. We expect simplified solicitations to result in better applications that will more directly address the critical issues and that can be reviewed more efficiently and effectively by applicants and our staff.
- We improved transparency and communication with applicants.
- We reorganized our staff into technology domain groups, to create efficiencies and capitalize on the expertise of our staff.
- We worked creatively to ensure that projects seeking loan guarantees can meet important and fast approaching deadlines, including the expiration date for the Section 1603 cash grant program, which was critical to many of our projects, and the 1705 program's sunset date of September 30, 2011.

In light of these many changes and improvements, the Loan Programs are well positioned to carry out the important mission we have been given by Congress and the Secretary, while ensuring that taxpayer monies are properly safeguarded.

Chairman Frelinghuysen. Please explain how the Department is monitoring the health of its loan guarantee recipients. Do you see any more defaults on the horizon? If you did, what would you do to prepare for them?

Secretary Chu. The Department monitors the health of its loan recipients in much the same way that commercial lenders and other federal project lenders do, with a dedicated portfolio management division staffed by asset monitoring and credit review professionals in conjunction with internal legal and engineering teams and assisted by third party collateral agents, outside counsel, and other third party specialists. The Department's Portfolio Management Division monitors all aspects of the business condition of DOE's borrowers and their key counterparties, including industry developments, changes in the competitive landscape, and business performance of the project parties. The purpose of such a comprehensive monitoring effort is to enable the Department to be proactive in managing the portfolio and responsive to emerging issues, with the goal of keeping options open to minimize risk and maximize loan recovery while meeting policy objectives.

The probability of default and the estimated amount of recovery in the event of a default is assessed prior to making all loans and regularly reassessed during the loan repayment period. Fluctuations in these probability estimates are commonplace in any loan portfolio and are not unique to DOE. However, these estimates are subject to change both positively and negatively as business conditions change.

If the Department's Portfolio Management Division staff determines that a reasonable potential for a default exists, the loan will be placed on the watch list. This placement triggers a higher level of scrutiny of the borrower, more frequent reporting of loan-related developments to senior management of the Department, and required involvement of senior leadership in decisions regarding the borrower or the loan.

In cases where default appears probable, the Department's Portfolio Management Division will draw upon additional support, such as outside bankruptcy counsel, financial advisors and restructuring advisors to prepare potential restructuring options and strategies in order to attempt to mitigate the default condition or, if necessary, maximize recovery.

BLUE RIBBON COMMISSION RECOMMENDATIONS

Chairman Frelinghuysen. Mr. Secretary, the budget request includes millions of dollars within the Nuclear Energy account – an account whose programs are already cut $93 million below last year – to push forward Blue Ribbon Commission recommendations that the Administration has neither the authority nor the support to implement. While I recognize that we will undoubtedly need a second repository at some point, the way the Administration is trying to sweep its Yucca Mountain mess under the rug is not acceptable. You ask for funds to research interim storage, which you likely cannot implement without legislation. Additionally, you ask for $2.5 million to support a "consensus-based" approach to siting. This is far beyond anything which you have the authority to implement.

Is the Administration proposing any legislative changes to allow it to move forward on the Blue Ribbon Commission recommendations?

Secretary Chu. I directed that a departmental detailed review be undertaken of Commission's recommendations. The results of this review will inform my thinking, and that of the Administration, as to the best national path forward for the management and disposition of the nation's commercial and defense nuclear materials. The specifics of a new national strategy that accounts for the Commission's recommendations will need to be addressed in partnership with Congress.

Chairman Frelinghuysen. In the rest of this bill, we cut out funding that is requested for programs that are unauthorized. How much can we cut out of your budget request if interim storage and "consensus-based" siting are not authorized by the time we pass this bill?

Secretary Chu. All current and planned activities are authorized under the Nuclear Waste Policy Act.

USEC -- RATIONALE FOR TAXPAYER SUPPORT

Chairman Frelinghuysen. Mr. Secretary, your budget request contains over $150 million in the nonproliferation account to support the enrichment technology proposed by USEC. As you know, there is great support in some quarters to help this company bring their technology to market. Others think this effort would be nothing more than an earmark to a company that is simply not viable commercially. Would you give us your take on the situation?

Secretary Chu. I believe it's important for the United States to maintain a domestic capacity for uranium enrichment to achieve some of our most important national security and nonproliferation policy objectives. A domestic uranium enrichment capability provides the country with the technical ability to detect proliferant programs, to produce tritium, and to discourage the spread of enrichment technology by contributing directly to sustained confidence in the international commercial enrichment market. The most promising path forward is currently ACP.

To ensure that our investment will be safeguarded appropriately, the Department of Energy will condition its support for the ACP on being granted full government use rights to intellectual property for the American Centrifuge technology.

EFFECTIVENESS OF ADMINISTRATION'S GREEN CAR INVESTMENT AGENDA

Chairman Frelinghuysen. Mr. Secretary, one of my greatest priorities is to keep jobs in the United States. However, we all have to ensure that our taxpayer dollars are being used effectively. In that vein, let's take a few moments to discuss how successful the more than $5 billion that the Administration has poured into the electric-car industry over the last three years.

It seems to me as if this investment has had questionable success. A December 7th Washington Post article included half a dozen recipients of these electric car investments that have been forced to lay off employees, scale back production, or declare bankruptcy because they couldn't sell enough of their product. And unrealistic projections by your Department didn't help. A February report issued by your Department estimated that production capacity of popular electric vehicles would top 44,000 in 2011 here in the United States. According to that article, the actual capacity was just 16,800.

With all of these implementation problems, the ATVM loan program, pushed strongly by your Administration to support green cars, has more than $4 billion in so-called "emergency" funds sitting there, which staff has been told by your Department mostly will not be able to be used. At the same time, your budget request includes more than $400 million for advanced manufacturing R&D, just 1/10th of the ATVM funds.

Would you support rescinding some of those funds to offset any new work you'd propose? If not, why not?

Secretary Chu. No. The ATVM Loan Program has closed five loans totaling over $8.3 billion. The ATVM Loan Program continues to be an attractive source of funding for automotive manufacturers of vehicles and components, receiving new applications and indications of interest regularly. We are striving to effectively allocate the remaining ATVM credit subsidy to support promising projects consistent with the intent of Sec. 136 of the Energy Independence and Security Act of 2007.

In addition, the remaining balances are no-year emergency funds originally appropriated in FY2009. The emergency designation effectively prevents a rescission of such funds from being used as an offset for new non-emergency expenses.

Chairman Frelinghuysen. Do you see the Department's strengths to be in the research and development supporting the next generation of vehicles, or in managing loans and loan guarantees?

Secretary Chu. The Department recognizes the importance of both and has strengths in research and development supporting the next generation of vehicles through programs such as the Office of Energy Efficiency and Renewable Energy's Vehicles Technology Program and managing loans through the Loan Program Office's ATVM Loan Program.

ADDITIONAL QUESTIONS FROM MR. SIMPSON OF IDAHO

Mr. Simpson. Congress approved a new licensing support program for small modular reactors in 2012. Can you give us an idea of what you hope to accomplish in this program this year and what will be supported in the program in 2012?

Secretary Chu. Due to the continuing resolution that lasted into the first quarter of FY12, funding for this program was not received until December 2012. The SMR program involves a complex and deliberate selection and award process for a financial assistance award that will last six to eight months. The process included a 30 day stakeholder comment period on a draft Funding Opportunity Announcement (FOA). The final FOA allows 60 days for application submittal. After submittal of the applications, the merit review and selection process will begin and will likely conclude mid- to late-summer 2012. Once awardees are selected, DOE must develop and negotiate the cooperative agreements that will address the management of the DOE funding provided to the selected projects. DOE hopes to have these agreements completed by the end of calendar year 2012. Once the program is underway, DOE intends to have a clear and measurable set of milestones that will be used to gauge progress and accomplishments.

Mr. Simpson. What benefits do small reactors bring to the market?

Secretary Chu. The Department believes that small modular reactors (SMRs) have the potential for adding a new, safe, clean and affordable nuclear energy option to the mix of domestic energy technologies. SMRs offer more flexibility in financing, siting, and end-use applications than large reactors. SMRs may reduce an owner's initial capital outlay due to the anticipated lower capital cost for SMRs and improve cost by reducing construction schedule durations through the use of modular components produced in a factory and transported to the site for assembly. SMRs may be used to provide power for applications where large plants are not needed or where infrastructure to support a large unit is lacking, such as smaller electrical markets, isolated areas, smaller grids, or restricted water or acreage sites. If DOE is successful in helping to establish a domestic and international market for SMRs, the economy stands to benefit through associated domestic job growth, increased manufacturing capacity, and export growth in the nuclear sector.

Mr. Simpson. Your budget also includes support for small modular reactor research. Is this funding primarily for non-light water reactor technology?

Secretary Chu. The SMR Advanced Concepts R&D Program will primarily pursue R&D on non-light water technologies concepts and on generic technical issues affecting all SMRs. Advanced SMR R&D is needed to address long term technology issues such as materials, energy conversion, components and technology development. However, some aspects of technology development may have applicability to generic safety and licensing issues that will benefit both near term light water and advanced concept SMRs.

Mr. Simpson. Can you tell us how would federal loan guarantees affect the relative economics of new nuclear power plants?

Secretary Chu. The Energy Policy Act of 2005 established the Section 1703 loan guarantee program to provide loan guarantees to projects that avoid, reduce or sequester air pollutants or anthropogenic greenhouse gas emissions and employ innovative technologies.
Projects that incorporate innovative technologies often experience difficulty in attracting private financing at reasonable rates. A federal loan guarantee is a way to stimulate private sector investment.

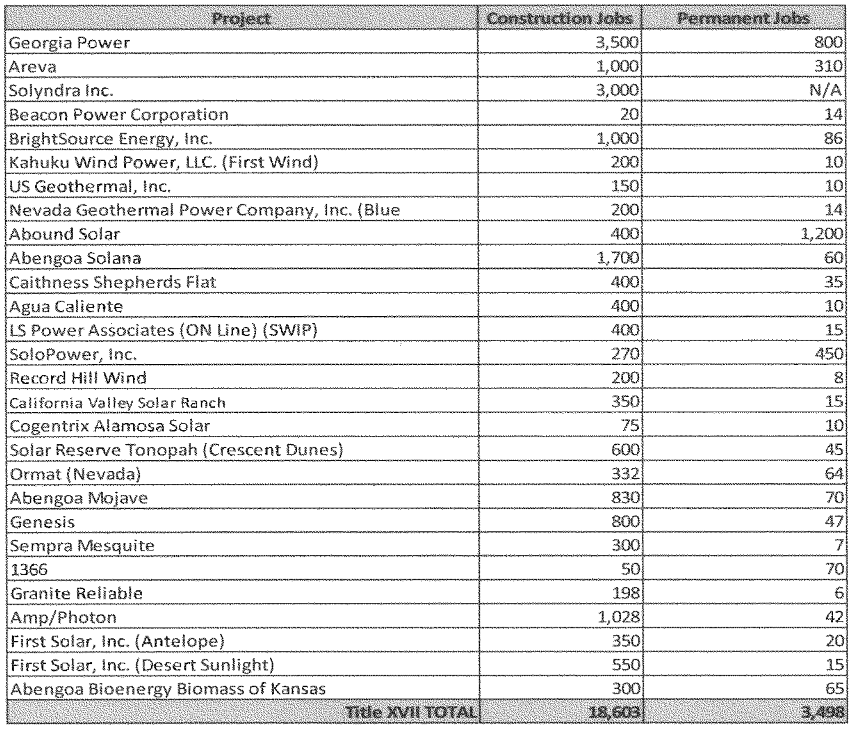
For new nuclear power plants, a large investment of capital is needed, especially initially, during construction. A loan guarantee can reduce the cost of financing this large investment.

Mr. Simpson. Are we expecting an announcement on the loan guarantee for Plant Vogtle soon?

Secretary Chu. It is Department policy not to discuss specific applications.

Mr. Simpson. Your budget says that the projects funded through the loan guarantee program are projected to fund over 22,000 permanent and construction jobs in the U.S. I understand the Vogtle project will have 5,000 construction jobs and 800 permanent jobs at that site for the next 4 years. Can you provide to the committee a list of where you expect the other jobs to be created?

Secretary Chu. As of April 10, 2012, the Department expects the Title XVII projects (including both conditionally committed and closed loan guarantees) to support 22,101 permanent and construction jobs. The breakout of these jobs by project is as follows:



Project	Construction Jobs	Permanent Jobs
Georgia Power	3,500	800
Areva	1,000	310
Solyndra Inc.	3,000	N/A
Beacon Power Corporation	20	14
BrightSource Energy, Inc.	1,000	86
Kahuku Wind Power, LLC. (First Wind)	200	10
US Geothermal, Inc.	150	10
Nevada Geothermal Power Company, Inc. (Blue	200	14
Abound Solar	400	1,200
Abengoa Solana	1,700	60
Caithness Shepherds Flat	400	35
Agua Caliente	400	10
LS Power Associates (ON Line) (SWIP)	400	15
SoloPower, Inc.	270	450
Record Hill Wind	200	8
California Valley Solar Ranch	350	15
Cogentrix Alamosa Solar	75	10
Solar Reserve Tonopah (Crescent Dunes)	600	45
Ormat (Nevada)	332	64
Abengoa Mojave	830	70
Genesis	800	47
Sempra Mesquite	300	7
1366	50	70
Granite Reliable	198	6
Amp/Photon	1,028	42
First Solar, Inc. (Antelope)	350	20
First Solar, Inc. (Desert Sunlight)	550	15
Abengoa Bioenergy Biomass of Kansas	300	65
Title XVII TOTAL	18,603	3,498

Mr. Simpson. Isn't it correct to state that the benefits of a loan guarantee program would flow through to electricity consumers?

Secretary Chu. The Department believes that a large portion of the benefit of the lowered interest rate from a DOE loan guarantee for power generation projects, as well as the value of tax credits and other forms of subsidies, are passed on to the utility rate payers. The key is that the project sponsors generally bid on and negotiate power purchase agreements (PPAs) based on their expectations of project economics, taking into account factors such as interest rates, tax credits, etc., in its bid. Ultimately, the bid with the lowest costs, which should include the greatest sharing of the benefits with the ratepayer, is the bid most likely to win a competitive PPA process. If certain elements of the expected benefits do not materialize, the sponsor's profit is eroded, and if expectations prove sufficiently incorrect, the economics of the project may not warrant proceeding.

Mr. Simpson. Do you believe your 2013 budget request helps to act expeditiously on the BRC recommendations?

Secretary Chu. Yes. The FY 2013 budget request includes $60 million for R&D on storage, transportation, and disposal of nuclear waste. This aligns with continued activities that support the near-term recommendations put forward by the Blue Ribbon Commission on America's Nuclear Future. The budget request continues activities initiated in FY 2012 and specifically focuses on evaluating consolidated interim storage and transportation issues (focused initially on decommissioned sites); working with industry to develop standardized approaches to used fuel management; conducting material testing to support extended storage of used fuel; revisit and prepare a report on plans to address recommendations identified by the National Academy of Sciences transportation report; and initiating research on geologic disposal alternative environments, e.g. system modeling, engineered barriers, natural barriers, evaluation of design concepts, and experiments.

Mr. Simpson. The president's FY2013 budget request asks for $10 million from the nuclear waste fund. You have also asked for $60 million for R&D on storage, transportation, and disposal of used nuclear fuel and radioactive waste. Are you planning to offset the $60 million in spending with the $10 million from the fund?

Secretary Chu. Yes, the $10M from the nuclear waste fund is included in the total $60M.

Mr. Simpson. Since you are only planning on spending $60 million for used fuel related activities, what is the justification for continuing to collect over $750 million from electricity consumers in the form of Nuclear Waste Fund Fees? Wouldn't it make better public policy to suspend collections until Congress determines future funding needs and funding methods when it enacts a new program based on the Blue Ribbon Commission's recommendations?

Secretary Chu. The Nuclear Waste Policy Act establishes a fee of one tenth of a cent per kilowatt-hour of electricity generated and sold, to be paid by the nuclear utilities in order to defray the total lifetime cost of storage and ultimate disposal for waste generated by those utilities. This fee results in the deposit of approximately $750 million of receipts annually into the Nuclear Waste Fund. The Act further provides that the Secretary shall review the adequacy of this fee annually and propose an adjustment of the fee to Congress only upon determining that either insufficient or excess funds are being collected to defray the total lifetime costs of the Department's waste management program.

The Department completed its most recent annual review of the adequacy of the Nuclear Waste Fund fee in December 2011. That review concluded that, given the Department's continuing obligation to take title to and ultimately dispose of nuclear waste – an obligation the Department has continually affirmed it remains committed to meeting – there is no reasonable evidentiary basis to determine that the current fee is either insufficient or excessive. Without such evidence, the Secretary cannot lawfully "suspend" collection of the fee.

Mr. Simpson. Mr. Secretary, do you know if DOE has adequate levels of trained engineers and other scientific personnel to support DOE headquarters and lab operations for the next decade?

Secretary Chu. DOE is committed to the continued benefits of advancing science, research and technology by hiring and developing engineers and scientists from universities, government and industry. DOE attracts scientists and engineers who want to be on the forefront leading our nation into the future. Our engineers and scientists are engaged in a wide range of challenging and innovative work from participating in groundbreaking international initiatives like the Global Nuclear Partnership, to solar power demonstration projects, to projects that convert captured carbon dioxide (CO2) emissions from industrial sources into fuel, plastics, and fertilizers.

DOE is committed to developing and maintaining a talent pool of well-qualified scientific and technical candidates with skills to meet current and projected needs through: (1) recruiting, redeploying, and promoting qualified personnel from inside and outside DOE; (2) implementing leadership development programs; and (3) working to demonstrate a strong commitment to reducing the under-representation of women and minorities. While a number of the staff will likely retire during the next decade, a skill/knowledge gap problem will be avoided by continuing to execute strong succession plans, and recruiting replacements at the current pace.

However, we continue to experience significant difficulty recruiting world-renowned senior scientists, engineers and technical experts for short term/high impact research. Traditional recruitment efforts frequently take longer and still do not yield suitably qualified candidates. While these are specialized circumstances, pending Legislative language in S. 1160, would provide the Department hiring authority and compensation flexibility to address this shortcoming.

Besides federal oversight, Laboratories are staffed by Management and Operating (M&O) contractors. The M&O contracts require labs to hire and retain adequate levels of engineers and scientists in the contractor workforce.

DOE offers unequalled opportunities and maintains a strong cadre of engineers and scientific personnel that can support DOE headquarters and lab operations as we head into the next decade. This is an exciting and desirable place to work for scientists and engineers.

Mr. Simpson. In your judgment, would a larger pool of trained nuclear scientists and engineers improve U.S. competitiveness in the global nuclear energy market?

Secretary Chu. The global nuclear energy market is complex and competitive. That competitiveness is driven by many factors and although I cannot state definitively that a larger pool of nuclear scientists and engineers would improve our overall competitiveness, I can say that an insufficient number would most likely limit our ability to compete.

The need to grow the trained workforce pool will be driven by a number of market demands. For example, an increasing percentage of the current U.S.

nuclear energy workforce is approaching retirement and will need to be replaced. According to the Nuclear Energy Institute (NEI), the electric power industry alone will have to replace nearly 100,000 skilled workers—more than 25,000 of them in the nuclear industry—by 2015. Many thousands more are near-term retirees with advanced scientific and engineering degrees who perform essential nuclear energy research and security studies at our national laboratories and will also need to be replaced. In addition, a larger pool of trained scientists and engineers will be needed to support the projected expansion of the number of nuclear power plants in the U.S. to be constructed as part of the nuclear renaissance now underway as illustrated by new unit construction at the Vogtle Electric Generating Plant in Georgia. NEI projects that each new commercial power plant will require up to 3,500 skilled workers during construction and 400 to 700 operations and maintenance workers in the long-term.

According to a 2010 Energy Policy Institute analysis, the "moderate deployment" projection for commercialization of Small Modular Reactors will result in an additional 200,000 construction and manufacturing jobs and tens of thousands of skilled operations and maintenance jobs to be created by 2030.

Mr. Simpson. Earlier this month, on February 7, the President's Council of Advisors on Science and Technology said the nation must produce approximately 1 million more science, technology, engineering and math (STEM) professionals over the next decade than are projected to graduate at current rates. What evidence can you provide this committee to justify the termination of the Office of Nuclear Energy Integrated University Program supporting nuclear science, technology and engineering?

Secretary Chu. The Department agrees that the Integrated University Program has yielded very good results in support of university-level students studying the nuclear science and engineering fields of study. However, the Department feels that the approach mandated by the Integrated University Program is a less efficient means of advancing the Administration's Science, Technology, Engineering and Math (STEM) education objectives than that which can be achieved by other existing programs. For example, a Department-wide STEM education program has been initiated by the Associate Deputy Secretary of Energy to more effectively address such efforts across all DOE technical programs for more efficient administration and allocation of resources. This effort will also allow for more effective support to students from minority-serving institutions through direct coordination with similar programs under the direction of the Office of Economic Impact and Diversity.

Also, the Department is confident that expansion of the nuclear industry will create incentives necessary for students to enter nuclear-related programs. For example, the Nuclear Energy Institute recently announced that the nuclear energy industry is providing record funding to institutions of higher education. In 2011, the industry contributed more than $15 million to universities and community colleges to support nuclear engineering programs and nuclear energy technician programs through cash grants, scholarships, fellowships, equipment donations, internships, co-ops and subject matter expert support.

Mr. Simpson. What message, in your judgment, does the zeroing out of the Integrated University Program send to aspiring scientists and engineers entering college?

Secretary Chu. In order to avoid sending a negative and chilling message to aspiring scientists and engineers currently enrolled or entering college, it will be essential that the Department implement an active communications program to effectively engage faculty and students in the nuclear science and engineering fields of study to ensure that they are fully aware of, and able to provide feedback to, Department actions in support of the Administration's Science, Technology, Engineering and Math (STEM) education objectives and initiatives. This communications element will be a key component of the Department-wide STEM education program that has been initiated by the Associate Deputy Secretary of Energy to more effectively address such efforts across all DOE technical programs for more efficient administration and allocation of resources. This communication effort will also be effectively extended to students from minority-serving institutions through direct coordination with similar programs under the direction of the Office of Economic Impact and Diversity.

Mr. Simpson. Secretary Chu recently testified that he intends to separate civilian and defense used nuclear fuel issues. What does that mean? Does the Secretary believe he has the legal authority under the Nuclear Waste Policy Act to overturn the previous presidential determination to handle these materials together? Will this not require two repositories and make the solution to the spent fuel issue that much harder?

Secretary Chu. The Blue Ribbon Commission ("Commission") urged, as an extension of its work, that "…the Administration to launch an immediate review of the implications of leaving responsibility for disposal of defense waste and other DOE-owned waste with DOE versus moving it to a new waste management organization." Such a review is reasonable in the context of refreshing the nation's strategy for the management and disposition of the nation's commercial and defense nuclear materials. As such, the Department is determining if conditions have changed since the original 1985 Presidential Decision that found "no basis to conclude that a defense only repository is required." This decision was strongly influenced by projected cost efficiencies for a combined repository, as well as other factors required by the Nuclear Waste Policy Act (NWPA), as amended, such as health and safety, regulations, transportation, public acceptability, and national security.

Conditions may have changed in the ensuing three decades that may be cause for recommending a different approach. The departmental working group is considering multiple options for designing a system for management and disposition of both commercial and defense nuclear materials, including analyzing the potential benefits and costs of separating disposal pathways. The specifics of a new national strategy that accounts for the Commission's recommendations will need to be addressed in partnership with Congress.

Mr. Simpson. Secretary Chu, your budget proposes a ten percent cut to nuclear energy research and development while it once again proposes large increases for renewable energy funding. When you see what nuclear energy contributes to baseload electric power generation in this country, I do not see a commensurate investment in that technology. Please explain this.

Secretary Chu. As the President emphasized in his State of the Union Address, "this country needs an all-out, all-of-the-above strategy that develops every available source of American energy." Nuclear energy will continue to play an integral role in our nation's energy mix. Nuclear energy currently supplies over 70 percent of our nation's carbon-free electricity and NE will continue to explore the avenues that offer the highest probability of nuclear power fulfilling this role.

The President's fiscal year 2013 budget requests $770.4 million for the Office of Nuclear Energy.

Mr. Simpson. The DOE budget contains $12 million to fund a multi-year research initiative, in collaboration with EPA and USGS, that will focus on "understanding and reducing the environmental, health, and safety risks of natural gas and oil production" from shale formations. Can you tell us specifically what this initiative is intended to accomplish? How will this differ from EPA's ongoing hydraulic fracturing study? Isn't there a risk of duplication of effort here?

Secretary Chu. DOE's FY 2013 Natural Gas budget request will focus on high priority research recommendations received from the Subcommittee of the Secretary of Energy Advisory Board (SEAB).. Through this collaboration, a robust Federal R&D plan is being developed, taking into account the recommendations of the Secretary of Energy Advisory Board (SEAB) Natural Gas Subcommitee. DOE's role in this initiative will focus on priorities identified by the interagency collaboration in a research plan to be formed over the next nine months within its area of core research competencies, including wellbore integrity, flow and control; green technologies; and systems engineering, imaging, and materials.

Mr. Simpson. On November 18, 2011, the Secretary of Energy Advisory Board (SEAB)'s Shale Gas Subcommittee sent you its second 90-day report on measures that can be taken to reduce the environmental impact and ensure the safety of shale gas production. One of the Report's recommendations was to increase Federal funding for the State Review of Oil and Natural Gas Environmental Regulations (STRONGER) and the Ground Water Protection Council (GWPC). Is funding provided for these organizations in the President's budget proposal? If not, do you agree with the Report's recommendation?

Secretary Chu. The Department has been funding the Ground Water Protection Council to enhance the Risk Based Data Management System to improve the protection of ground water resources. In FY 2012, new components relevant to environmental topics associated with hydraulic fracturing will be added to the system. Although the Department has not provided funding to STRONGER for several years, we have participated in their state regulatory program reviews, which highlight strengths and make recommendations.

Mr. Simpson. The SEAB Report also recommended that DOE and/or EPA make grants to states to enable them to have STRONGER review their shale gas regulations. Does the President's budget include funding for such DOE grants? If not, do you agree with the Report's recommendation?

Secretary Chu. As noted elsewhere, the Administration is working to develop interagency collaboration intended to target R&D towards the best and highest use of agency skills.

Mr. Simpson. The SEAB Report also recommended a several-year effort of DOE funding for shale gas research and development. Can you explain whether the President's budget responds to this recommendation? If so, can you explain what DOE will focus the R&D funding for shale gas on?

Secretary Chu. DOE, EPA, and USGS will identify research priorities, collaborate to sponsor research that improves our understanding of the impacts of developing our Nation's unconventional oil and gas resources, and ensure the safe and prudent development of these resources as part of the President's budget request. This program will respond to high priority recommendations of the SEAB Report.

Each agency has a different combination of experiences, research strengths, personnel, resources, and mission mandates, leading to complementary research core competencies. DOE's core competencies include wellbore integrity, flow, and control, green technologies, systems engineering, imaging, and materials.

Mr. Simpson. There has been some media attention on whether natural gas wells have produced at the expected level (i.e. whether the gas produced matches what was anticipated). Do you think DOE should focus some of the R&D funding on technology to ensure the maximum energy production from new and existing wells?

Secretary Chu. While it is important to the private sector to maximize production efficiency, the DOE FY 2013 Natural Gas budget request will focus primarily on high priority research recommendations received from the Subcommittee of the Secretary of Energy Advisory Board. The research efforts will help to improve our understanding of the impacts of developing our Nation's unconventional natural gas resources and assist in developing new technologies that will enhance safe and environmentally sustainable development of these resources.

Mr. Simpson. Secretary of Interior Salazar, in testimony recently, indicated that, based on his review of research on hydraulic fracturing, shale gas production can be safely accomplished. Is that your considered assessment as well?

Secretary Chu. The Department is working with EPA and USGS to support the development of policy-relevant science that improves our ability to minimize the potential environmental, health, and safety impacts of shale gas development through hydraulic fracturing.

ADDITIONAL QUESTIONS FROM MR. ALEXANDER OF LOUISIANA

Mr. Alexander. The GAO report, "Energy-Water Nexus: Information on the Quantity, Quality & Management of Water Produced During Oil and Gas Production" mentions that "over 100 federal research studies conducting during the last 10 years have addressed various aspects of using, managing, and treating produced water." Similarly, the President's State of the Union Address said that the government has been investing in shale energy extraction research for over 30 years. So after a minimum of 100 federally funded studies just on produced water and 30 years of investment, what else do you need to determine that shale energy is safe?

Secretary Chu. The Department's focus will be research that mitigates the environmental and safety consequences of development of these resources including wellbore integrity (improved casing and cementing integrity), flow and control; green technologies; and systems engineering, imaging, and materials.

Mr. Alexander. The president's FY 2013 budget includes an interagency study that the DOE, EPA and USGS are partnering on to examine the environmental and health effects of hydraulic fracturing. Can you provide a little more detail on this study?

What is the total cost and how much is from the DOE budget?

Secretary Chu. The President's FY 2013 budget includes $45 million for this collaborative research effort (not a study), with DOE requesting $12 million of that $45 million.

Mr. Alexander. Can you explain the purpose behind the study?

Secretary Chu. This collaborative research program – again, not a study – will focus on timely, policy relevant science directed at research topics that support sound policy decisions by State and Federal agencies responsible for ensuring the prudent development of energy sources while protecting human health and the environment.

Mr. Alexander. How is this any different from what EPA is currently doing?

Secretary Chu. This is a broader collaborative effort among the agencies for unconventional oil and natural gas development research, which is different than EPA's study on the potential impacts of hydraulic fracturing on drinking water resources. Each agency will bring their own core competencies to the research efforts.

Mr. Alexander. When will it be initiated?

Secretary Chu. The collaboration effort is planned to officially begin in FY 2013, although some current and previously funded research is relevant to the initiative.

Mr. Alexander. Has any preparatory work been initiated?

Secretary Chu. A research plan for unconventional oil and gas research by the three agencies will be completed this fiscal year.

Mr. Alexander. Who will be the lead Agency?

Secretary Chu. The three agencies will create a Steering Committee to coordinate the agencies' activities for unconventional oil and gas research. The lead agency of the Steering Committee will rotate annually among the three agencies in alphabetical order: DOE, DOI, EPA.

Mr. Alexander. How will peer review and stakeholder input be incorporated?

Secretary Chu. The Steering Committee will provide leadership, coordinate the activities of the three participating agencies, and reach out to other relevant Federal, state and local organizations. Also, as part of establishing a research plan for this effort, the Steering Committee will solicit comments from the scientific community, public and relevant stakeholders and will hold periodic workshops for this purpose, as appropriate.

Mr. Alexander. How is this any different than any of the other studies that have already been conducted?

Secretary Chu. This will be a collaborative research program, not a study. This effort will identify research priorities and collaborate to sponsor research to address the potential impacts of developing our Nation's unconventional natural gas resources and ensure that these resources are developed in a safe and environmentally sustainable manner. This collaboration responds to high priority recommendations of the Secretary of Energy Advisory Board Subcommittee on Natural Gas.

Mr. Alexander. Is one of the goals to find ways to shut down or slow domestic oil and natural gas production?

Secretary Chu. The goal is to provide results and technologies that support sound policy decisions by State and Federal agencies responsible for ensuring the prudent development of energy sources while protecting human health and the environment.

Mr. Alexander. Would you agree that the only way we will able to develop our vast natural gas resources is through the use of hydraulic fracturing? If that is the case, why is the Administration looking to find ways to shut down the use of hydraulic fracturing?

Secretary Chu. In the White House 's "Blueprint for a Secure Energy Future" ("Blueprint"), a comprehensive plan was established to reduce America's oil dependence, save consumers money, and make our country the leader in clean energy industries. The Blueprint supports the responsible development of the Nation's oil and natural gas resources, with the specific goals of promoting safe practices and reducing energy imports. The Department of Energy, the Department of the Interior, and the Environmental Protection Agency each will have a critical role to play in this mission.

Mr. Alexander. Has the DOE ever devoted any research money to studying techniques that can be used to recycle the recovered water from hydraulic fracturing to be reused in an economical way?

Secretary Chu. Since FY 2008, the Department has been supporting research initiatives addressing treatment and reuse/recycling of produced water and flowback water during hydraulic fracturing.

Mr. Alexander. Both NGOs and industry have thoroughly criticized the EPA for lack of transparency in the scientific methodology behind its multi-year water quality study on the impacts of hydraulic fracturing. As a result, millions of dollars are being spent on a report that, like the EPA's recent investigation into alleged contamination Pavillion, Wyoming, may not hold up to scrutiny from either side. What lessons do you plan to take from that process for your joint effort?

Secretary Chu. The three agencies will create a Steering Committee to coordinate the agencies' activities for unconventional oil and gas research. The Steering Committee will provide leadership, coordinate the activities of the three participating agencies, and reach out to other relevant Federal, state and local organizations. Also, as part of establishing a research plan for this effort, the Steering Committee will solicit comments from the scientific community, public and relevant stakeholders and will hold periodic workshops for this purpose, as appropriate.

Mr. Alexander. What kind of measures were taken to oversee and ensure consistency of the information put out by the DOE Secretary of Energy Advisory Board - Natural Gas Subcommittee?

Secretary Chu. The Secretary of Energy Advisory Board (SEAB) is a Federal advisory committee to the Secretary of Energy organized and established pursuant to the Federal Advisory Committee Act (FACA). As such, the information and recommendations it develops and publishes represents only the insights and views of the SEAB. Pursuant to the FACA, the Secretary of Energy receives information and recommendations from the SEAB at the same time as the public.

Mr. Alexander. What kind of oversight and attention to detail do you think it demonstrates when the DOE and the Committee can't even agree on the Committee's name?

Secretary Chu. The Secretary of Energy Advisory Board (SEAB) is a Federal advisory committee to the Secretary of Energy organized and established pursuant to the Federal Advisory Committee Act (FACA). As such, the DOE did not exercise any oversight except to ensure that the activities of the SEAB were consistent with the FACA.

Mr. Alexander. Recent regulatory action taken by the Department of Energy (DOE) threatens to remove highly popular decorative vented gas hearth products from the marketplace. These products are designed and intended to provide the ambiance of an attractive, realistic fire without excessive heat. As a result of DOE's rulemaking, U.S.-based jobs related to the manufacturing, distribution, and sale of these decorative gas products could be eliminated at a time when our country can scarcely afford to lose jobs.

Please explain why the Department is classifying decorative vented gas fireplaces and decorative vented gas log sets as "direct heating equipment," when in fact these products are not designed to produce heat.

Secretary Chu. In establishing the definitions pertaining to direct heating equipment in an April 2010 final rule, DOE recognized the aesthetic appeal of certain gas hearth products and included a provision in its definition of "vented hearth heater" that considered certain gas hearth products to be primarily decorative in nature, and excluded them from having to comply with DOE's minimum energy conservation standard otherwise applicable to vented gas hearth direct heating equipment. However, based upon manufacturer concerns regarding the basis for the exclusion expressed subsequent to the publication of the April 2010 final rule, DOE commenced a second rulemaking to address the issues and concerns raised. This rulemaking was completed in November 2011 with the publication of a final rule amending the criteria for certain vented gas hearth products to be considered as decorative products that are excluded from having to comply with standards.

Mr. Alexander. What is the Department's rationale for requiring energy efficiency standards for decorative vented gas fireplaces in an April 2010 final rule when the requirements were not included, or even mentioned, in the proposed rule, thus precluding consumers and hearth industry stakeholders from an opportunity to comment on the policy change?

Secretary Chu. In establishing the definitions pertaining to direct heating equipment in an April 2010 final rule, DOE recognized the aesthetic appeal of certain gas hearth products and included a provision in its definition of "vented hearth heater" that considered certain gas hearth products to be primarily decorative in nature, and excluded them from having to comply with DOE's minimum energy conservation standard otherwise applicable to vented gas hearth direct heating equipment. However, based upon manufacturer concerns regarding the basis for the exclusion expressed subsequent to the publication of the April 2010 final rule, DOE commenced a second rulemaking to address the issues and concerns raised. This rulemaking was completed in November 2011 with the publication of a final rule amending the criteria for certain vented gas hearth products to be considered as decorative products that are excluded from having to comply with standards.

Mr. Alexander. Please also explain how the Department released a final rule in November 2011 affecting these products when it has not placed any supporting data or analyses in the rulemaking record for the public or hearth industry stakeholders to consider.

Secretary Chu. In establishing the definitions pertaining to direct heating equipment in an April 2010 final rule, DOE recognized the aesthetic appeal of certain gas hearth products and included a provision in its definition of "vented hearth heater" that considered certain gas hearth products to be primarily decorative in nature, and excluded them from having to comply with DOE's minimum energy conservation standard otherwise applicable to vented gas hearth direct heating equipment. However, based upon manufacturer concerns regarding the basis for the exclusion expressed subsequent to the publication of the April 2010 final rule, DOE commenced a second rulemaking to address the issues and concerns raised. This rulemaking was completed in November 2011 with the publication of a final rule amending the criteria for certain vented gas hearth products to be considered as decorative products that are excluded from having to comply with standards.

Mr. Alexander. Estimates indicate that the use of decorative gas products account for only a minuscule proportion of natural gas usage in the United States. Why is DOE placing in jeopardy American jobs by issuing regulations that achieve minimal energy savings from decorative vented gas fireplaces?

Secretary Chu. In establishing the definitions pertaining to direct heating equipment in an April 2010 final rule, DOE recognized the aesthetic appeal of certain gas hearth products and included a provision in its definition of "vented hearth heater" that considered certain gas hearth products to be primarily decorative in nature, and excluded them from having to comply with DOE's minimum energy conservation standard otherwise applicable to vented gas hearth direct heating equipment. However, based upon manufacturer concerns regarding the basis for the exclusion expressed subsequent to the publication of the April

2010 final rule, DOE commenced a second rulemaking to address the issues and concerns raised. This rulemaking was completed in November 2011 with the publication of a final rule amending the criteria for certain vented gas hearth products to be considered as decorative products that are excluded from having to comply with standards.

ADDITIONAL QUESTIONS FROM MR. WOMACK OF ARKANSAS

Mr. Womack. As you are aware, wind power is one of the fastest-growing sources of electric power generation in the United States, increasing 28% in 2009 according to the EIA. In 2010, companies were eligible for production and investment tax credits and grants in lieu of tax credits if they built production facilities in the United States. Arkansas is reaping the benefits of these credits with the opening of a propeller production facility within the year in Fort Smith.

Where do you see wind energy in overall energy mix for stationary power over the next 5 years? 25 years?

Secretary Chu. In the U.S., installed wind capacity increased almost 16 fold between 2000 and 2010 and is now over 2% of our electricity generation. If U.S. wind capacity continued to grow at the current rate of approximately 12% per year, wind capacity at the end of 2016 could be over 80GW and nearly 4% of our electricity generation.

The actual amount of wind capacity deployed and the related projected energy mix will depend on a number of factors including: the total U.S. electricity demand, which will likely vary significantly dependent upon economic growth rates, the adoption of energy efficiency measures and rate of electrification of the automotive fleet; natural gas prices and development of other low cost alternatives; the levels and predictability of subsidization of both existing fossil based generation as well as subsidization of renewable energy sources, including the production tax credit for wind energy; and the availability and access to transmission capacity. (There is currently a queue of over 275 gigawatts of proposed wind power projects awaiting interconnection).

Mr. Womack. There have been reported problems with bursts of wind energy overloading long range transmissions wires. Is the Department aware of these issues and has there been consideration on how to upgrade the current infrastructure to accommodate the new mix in energy production?

Secretary Chu. The Department is very aware of the issues surrounding wind ramps or "bursts of wind energy" and currently has several activities underway to better understand and address the issue. For example, the Department's Office of Energy Efficiency and Renewable Energy Wind and Water Power Program has efforts underway, and is currently planning new efforts, to better understand how to forecast wind ramps. Furthermore, the Wind and Water Power Program and the Office of Electricity Delivery and Energy Reliability are working on ways to mitigate these types of events through transmission system operating procedures Additional transmission system facets that the Department is looking at more broadly that could also mitigate these wind ramps include generation dispatch, increased system flexibility, evaluation of new market structures that could better use existing system flexibility, and supporting the development of energy storage technologies that can help balance swings in energy production.

Mr. Womack. At what point do you think wind energy will be a profitable enough source of power to discontinue the tax credits and subsidies?

Secretary Chu. Although land-based wind energy is already cost-competitive without subsidization in specific electricity markets at very high wind speed locations, it is difficult to determine in advance exactly when wind power more generally would be competitive with other sources of electricity without the benefit of the current Production Tax Credit. Average wind deployment in Class IV wind speeds (7.25 m/s) is projected to achieve full cost parity with current predicted natural gas prices within the next ten years. However, whether wind is competitive in a particular market, state, or region depends on a number of additional factors including the availability and cost of transmission and the price of energy from other competing sources such as natural gas and other fossil fuels.

ADDITIONAL QUESTIONS FROM MR. NUNNELEE OF MISSISSIPPI

Mr. Nunnelee. Last year, after an extensive review of the Next Generation Nuclear Plant project, the Nuclear Energy Advisory Committee recommended that the Department move forward with a partnership with industry to develop High Temperature Gas Cooled Reactors. Can you tell me what progress you have made on this front?

Secretary Chu. To begin the process of establishing a partnership with industry to develop High Temperature Gas Cooled Reactors (HTGR), the Department is preparing a solicitation to obtain analyses, data and information on the long term commercial viability of HGTR technology. The scope of the anticipated contract has two parts. The first is to develop a credible economic/ business analysis detailing how industry may best engage in developing and commercializing the HTGR technologies as well as their potential benefits to the nation's energy security. The second is to provide data and analysis to the Department that could inform HTGR research and development efforts. The information provided will be used by the Department to formulate future activities for the Next Generation Nuclear Plant (NGNP) Demonstration Project.

Mr. Nunnelee. The DOE proposed budget also includes support for small modular reactor research. Is this funding primarily for non-light water reactor technology?

Secretary Chu. The SMR Advanced Concepts R&D Program will primarily pursue R&D on non-light water technologies concepts and on generic technical issues affecting all SMRs. Advanced SMR R&D is needed to address long term technology issues such as materials, energy conversion, components and technology development. However, some aspects of technology development may have applicability to generic safety and licensing issues that will benefit both near term light water and advanced concept SMRs.

Mr. Nunnelee. Secretary Chu, nationwide averages for gas prices are currently $3.72 a gallon. Over the past few days, there has been much discussion that the White House might be considering whether to release oil from the Strategic Petroleum Reserve to “ease the impact of rising oil prices on American families and businesses”.

Is the Administration planning to sell oil from the strategic reserves to lower prices?

Secretary Chu. The purpose of the Strategic Petroleum Reserve is to mitigate the impacts of supply interruptions. There have been increasing disruptions in the supply of oil to the global market over the past several months, which pose a substantial risk to global economic growth. In response, major producers have increased their output while drawing prudently on excess capacity. Looking ahead to the likelihood of further disruptions in oil sales and the expected increased demand over the coming months, we are monitoring the situation closely and will work with our partners in the International Energy Agency to take appropriate action to ensure that the market is fully and timely supplied.

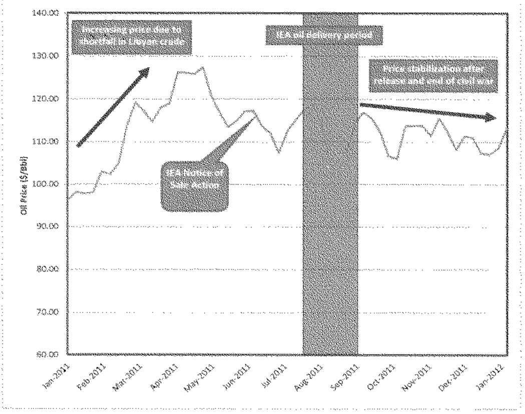
Mr. Nunnelee. What historical lessons can we learn from? This time last year, we were having this exact same conversation, as in June, the Administration released 30 million barrels of oil.

Secretary Chu. On June 23, 2011, the President announced that the United States would join other International Energy Agency countries in a collective action to release strategic reserves to mitigate the impacts of the sustained loss of crude oil resulting from the civil war in Libya. That action was the third time in history that the Strategic Petroleum Reserve was used for a Presidentially-directed drawdown and sale.
The reason for each SPR drawdown and sale is unique to the events occurring at that time and each has been a coordinated action with the IEA. The first SPR drawdown was called concurrent with the first Gulf War in 1991, Operation Desert Storm. The second drawdown followed the devastation to the oil production, refining, and distribution facilities from Hurricane Katrina in 2005.

The announcement of a decision to sell crude oil from the Strategic Petroleum Reserve provides assurance during a tight market that additional supplies will be available. The release of additional supplies helps to mitigate the economic impacts of supply interruptions until the markets can stabilize through increased production, resolution of the event causing supply interruptions, or other measures can be taken.

Mr. Nunnelee. When sales from the SPR were used to increase supply, what impact did the sale have on price and how long did that impact last before prices rose again?

Secretary Chu. The figure below provides a perspective of the effect of the IEA collective drawdown on oil pricesAs noted by EIA, "Attributing observed price changes since June 23 to the IEA announcement is difficult because of the other factors that continually affect oil prices, such as changing expectations of world economic and crude oil consumption growth, uncertainty over supply disruptions, estimates of OPEC spare production capacity, and other physical and financial market factors. It is also impossible to know with certainty how prices would have behaved had the release not been announced. World crude prices initially fell following the IEA's June 23 announcement of release from strategic reserves, but then rose above their pre-announcement levels in late June and early July."



Mr. Nunnelee. What would the sale of SPR oil do to the Reserve's inventory? If inventories went down due to this sale, what would we do if a serious disruption occurred to global oil supply?

Secretary Chu. Absent an actual or imminent supply interruption, there are no plans to release crude oil from the SPR. The SPR continues to be well-supplied, consistent with our IEA obligations, at 696 million barrels.

Mr. Nunnelee. As turmoil in the Middle East continues - coupled with emerging demand from third world developing countries, demand on foreign energy increases and that's going to cause gas prices to further increase. This problem is serious and it needs to be addressed now through exploring more domestic energy production.

I am concerned if we draw down on these reserves when gas hits $4.00 a gallon, what will we do if the reserves are depleted and then a real emergency hits?

Secretary Chu. The President has stated that the United States must pursue development of its energy resources, both conventional and alternative sources of energy. Indeed, after declining each year for decades, U.S. oil production is once again rising. Imports as a share of U.S. consumption are at their lowest level in 16 years. On natural gas production too, the numbers speak for themselves; From 2008 to 2010, production of shale gas doubled. Thanks in large part to shale gas, since 2009 the U.S. is now the largest producer of natural gas in the world. There are no plans to release crude oil from the SPR to bring down gas prices. The purpose of the Strategic Petroleum Reserve is to mitigate the impacts of supply interruptions. Moreover, the SPR remains well-supplied, consistent with our IEA obligations at 696 million barrels.

WEDNESDAY, MARCH 7, 2012.

DEPARTMENT OF ENERGY—NUCLEAR ENERGY AND NUCLEAR REGULATORY COMMISSION

WITNESSES

DR. PETER LYONS, ASSISTANT SECRETARY, OFFICE OF NUCLEAR ENERGY, DEPARTMENT OF ENERGY

GREGORY JACZKO, CHAIRMAN, NUCLEAR REGULATORY COMMISSION

Mr. FRELINGHUYSEN. The meeting will come to order. Good morning, everyone. Thank you for coming. I didn't mention it yesterday, but Mr. Olver substituted for Mr. Visclosky, and, kindly, Mr. Pastor is substituting today for my ranking member Pete Visclosky.

Pete Visclosky lost his mother, age 86, yesterday, so he was rightfully absent to be at her side. He is one of three surviving sons, and I believe Mr. Visclosky, his father, is alive and well. And on behalf of the committee, and I am sure all of those who know and like Pete, who is an incredible Member of Congress, we extend our public sympathy to him. Excuse me for doing that before you, but I thought that took priority. So, thank you very much.

I would like to welcome today Gregory Jaczko, Chairman of the Nuclear Regulatory Commission, and Peter Lyons, the Assistant Secretary for Nuclear Energy at the Department of Energy, to present the fiscal year 2012 budget request. I welcome you both, and we look forward to your testimonies.

When you appeared before the committee last year, the nation of Japan had just been devastated by a tsunami. It was in the midst of a nuclear crisis. I am pleased that our Nation, both on the military and civilian sides, was in a position to provide technical and humanitarian assistance to the Japanese people. I would like to thank you both for the work you did to help the Japanese people, and other parts of our government as well, in their time of need. And their time of need still exists, and there are lessons to be learned from that tragedy.

Although a year ago now, this tragic event and the lessons we are learning from it continue to shape the energy sector here in the United States and around the world. I hope we will have a chance to hear today how our nuclear sector is applying these lessons, and how your programs are helping in this regard. It is reassuring that the administration and Congress continue to value the role of nuclear power as a vital source of energy. Perhaps the strongest sign of this is in the recent NRC approval of the Vogtle Plants in Georgia, the first such approval in over three decades.

There is now wide acceptance that nuclear power is a safe, critical part of our energy mix, and I should note that this development occurred with strong support of the Congress and successive administrations over the years. Unfortunately, the budget request for fiscal year 2013 does not build upon that cooperative spirit, but instead shows some degree of divisiveness.

Although the President made a strong pitch in the State of the Union for an all-of-the-above energy strategy, there is no sign of such a balanced approach in the documents before us. Instead of investing in the two most important energy sources for the economic recovery of our country, nuclear and fossil, this budget request cuts funding for fossil by 21 percent and nuclear energy by 12 percent. At the same time, this request increases funding for energy efficiency and renewable energy by over $500 million. This is not what I would call an all-of-the-above energy strategy that is balanced and recognizes what really underpins the real economy.

At the same time, I regret this request continues the administration's wasteful and misguided Yucca Mountain policy, denying us an important and, I would say, long overdue repository for nuclear waste. Your budget request contains funding for projects to implement some of the Blue Ribbon Commission's recommendation, recommendations which Congress has not blessed either in whole or in part. As the current law of the land is for waste disposal at Yucca Mountain, we need to hear from you if the administration is proposing any legislative changes to authorize their recommendations. This is a too complex and important mission to be resolved unilaterally by the executive branch.

I ask the witnesses please assure us that the hearing record, questions for the record, and any supporting information requested by the subcommittee are delivered in final form to us no later than 4 weeks from the time you receive them. Members who have additional questions for the record will have until the close of business tomorrow to provide them to this subcommittee office.

With that, I turn to Mr. Pastor for any comments he may have.

OPENING STATEMENT

The Honorable Rodney Frelinghuysen
Energy and Water Development Subcommittee
House Committee on Appropriations

Hearing on the 2013 Budget Request for the
Nuclear Regulatory Commission
and
Department of Energy's Nuclear Energy programs
Wednesday, March 7, 2012

Good morning, everyone. I'd like to call this hearing to order. Today we have before us Gregory Jaczko, Chairman of the Nuclear Regulatory Commission, and Pete Lyons, the Assistant Secretary for Nuclear Energy at the Department of Energy, to present their fiscal year 2013 budget requests. I welcome you both and look forward to your testimony.

When we met last year, the nation of Japan had just been devastated by a tsunami and was in the midst of a nuclear crisis. I'm pleased that this country, both on the military and civilian sides, was in a position to provide technical and humanitarian assistance to the Japanese people. I'd like to thank you both for the work you did to help in such a time of need.

Although a year ago now, this tragic event, and the lessons we're learning from it, continue to shape the energy sector here in the United States and around the world. I hope we'll have a chance to hear today how our nuclear sector is applying these lessons, and how your programs are helping in this regard.

It's reassuring that the people of this country have been able to see past the Fukushima event. Perhaps the strongest sign of this is the recent NRC approval of the Vogtle plants in Georgia, the first such approval in over three decades. There is now wide acceptance that nuclear power is a safe, critical part of our energy mix, and I should note that this development occurred with the strong support of the Congress and successive Administrations over the years.

Unfortunately, the budget request for fiscal year 2013 does not build upon cooperation, but instead drives division. Although the President made a strong pitch in his State of the Union for an "all of the above" energy strategy, there's no sign of such a balanced approach in the documents before us. Instead of investing in the two most important energy sources for the economic development of this country, nuclear and fossil, this budget request cuts funding for fossil by 21 percent, and nuclear energy by 12 percent! At the same time, this request increases funding for energy efficiency and renewable energy by more than $500 million. This is not what I'd call an "all of the above" energy strategy that's in the interests of this nation.

At the same time, I regret that this request continues the Administration's wasteful and misguided Yucca Mountain policy. Even worse, it requests funds to pursue recommendations of the Blue Ribbon Commission which have not been condoned by this Congress, in whole or in part. I understand that more work needs to be done before this country can develop a second needed repository, but I caution the Administration from rushing forward too quickly on the Commission's recommendations. This is too complex and important of a topic to be solved unilaterally by the Administration.

I'd ask the witnesses to please ensure that the hearing record, questions for the record, and any supporting information requested by the subcommittee are delivered in final form to us no later than four weeks from the time you receive them. Members who have additional questions for the record will have until close of business tomorrow to provide them to the subcommittee office.

With that, I will turn to Ranking Member Visclosky for any comments he may have.

Mr. PASTOR. Thank you, Mr. Chairman.

Good morning, Chairman Jaczko and Dr. Lyons. Good to see you again. Good morning, and thank you for being here and discussing the fiscal year 2013 budgets.

As you know, I have long advocated for a comprehensive energy policy for our Nation, and believe that our current ad hoc policy continues to imperil our economy, our national security, and our environment. I also firmly believe that in any conceivable and practical scenario, nuclear should be considered as part of the Nation's energy mix for decades to come.

I am convinced that the commercial nuclear energy sector in the United States is safe and effective. That being said, we must ensure that the lessons learned from last year's tragedy in Japan, their nuclear facility, be heeded, and we enhance the safety and emergency protocol at America's nuclear reactors. The policies of both the NRC and the Office of Nuclear Energy play a pivotal role in ensuring that our Nation has appropriate regulatory controls in place, but at the same time pursuing a research and development program to strengthen the nuclear industry.

We also should ensure that our domestic manufacturing base has the fullest opportunity to provide the stability and growth in our nuclear industry.

As we continue to examine the role of nuclear industry, the role they should play in our Nation's energy mix, we must find a solution to the final disposition of nuclear waste. The administration's termination of Yucca has only caused a higher level of uncertainty when it comes to this issue.

Dr. Lyons, the Office of Nuclear Energy is tasked with the executing of the Department's responsibility under the Nuclear Waste Policy Act and would be charged with furthering any recommendations of the Blue Ribbon Commission that we collectively decide to pursue as a Nation.

To be clear, I see the recommendations of the Blue Ribbon Commission as a supplement, not an alternative to Yucca. However, recognizing that there are actions that need to be taken regardless of the outcome of the debate and ongoing court cases on Yucca Mountain, I am interested in hearing more about the Department's plan in this regard.

Mr. Chairman, the NRC has historically been seen as a technical regulator above the fray of politics. I fear that this reputation has been tarnished and believe that you have some work to do to regain the confidence of many on this subcommittee and in Congress. I look forward to an update of your activities in this regard, as well as a dialogue of what you believe we should do in the United States to implement the lessons learned from the disastrous events in Japan.

Mr. Chairman, I thank you, and I yield back my time.

Visclosky Opening Statement at Hearing on FY13 Budget for Office of Nuclear Energy & the Nuclear Regulatory Commission

March 7th, 2012

Delivered on Behalf of Subcommittee Ranking Member Rep. Peter Visclosky

Good morning. Chairman Jaczko, thank you for taking the time today to discuss the FY 2013 NRC budget request. Dr. Lyons, it is good to see you again.

As you all know, I have long advocated for a comprehensive energy policy for our nation and believe that our current, ad-hoc, policy continues to imperil our economy, our national security, and our environment. I also firmly believe that in any conceivable and practical scenario, nuclear should be considered as part of the nation's energy mix for decades to come.

I am convinced that the commercial nuclear energy sector in the U.S. is safe and effective. That being said, we must ensure that the lessons learned from last year's tragedy at the Fukushima Daiichi nuclear facility are heeded and we enhance the safety and emergency protocols at America's nuclear reactors. The policies of both the NRC and the Office of Nuclear Energy play a pivotal role in ensuring our nation has appropriate regulatory controls in place, while simultaneously pursuing a research and development program to strengthen the nuclear industry. We also should ensure that our domestic manufacturing base has the fullest opportunity to provide for the stability and growth of our nuclear industry.

As we continue to examine the role the nuclear industry should play in the nation's energy mix, we must find a solution to the final disposition of nuclear waste. The Administration's termination of Yucca has only exacerbated the level of uncertainty when it comes to this issue. Dr. Lyons, the Office of Nuclear Energy is tasked with executing the Department's responsibility under the Nuclear Waste Policy Act and would be charged with furthering any recommendations of the Blue Ribbon Commission that we collectively decide to pursue as a nation. To be clear, I see the recommendations of the Blue Ribbon Commission as a supplement, not an alternative, to Yucca. However, recognizing that there are actions that need to be taken regardless of the outcome of the debate and ongoing court cases on Yucca Mountain, I am interested in hearing more about the Department's plans in this regard.

Chairman Jaczko, the NRC has historically been seen as a technical regulator above the fray of politics. I fear that this reputation has been tarnished and believe that you have some work to do to regain the confidence of many on this Subcommittee and in Congress. I look forward to an update of your activities in this regard, as well a dialogue of what you believe we should do in the U.S. to implement the lessons imparted from the disastrous events in Japan.

Thank you, Mr. Chairman, for the time.

Mr. FRELINGHUYSEN. Thank you, Mr. Pastor.

Also, I would like to thank all Members. We have a pretty good complement here this morning. There has been a lot of hearings going on, and there was some fall-off yesterday, but I am pleased that we have pretty much a full house here this morning.

Dr. Lyons, Mr. Secretary, the floor is yours. Thank you for being here.

Dr. LYONS. Thank you very much. Chairman Frelinghuysen and members of the subcommittee, thank you for the opportunity to appear before you today to discuss the President's fiscal year 2013 budget request for the Office of Nuclear Energy, or NE, at the Department of Energy.

When I testified before you last year, as you noted, the events at Fukushima were still unfolding. That situation is now stable, but with a very long cleanup phase ahead. Many contributions from the Department were instrumental in assisting our Japanese colleagues.

In the last year, my office reevaluated its R&D activities in light of Fukushima. Based on that review, we are accelerating our development of fuels with enhanced accident tolerance. We are using modeling and simulation to better understand operations in off-normal conditions, how nuclear plants respond to seismic events, and how reactor materials evolve over time. We are also enlisting the university community to focus on safety-related R&D projects, including such issues as the safe storage of used fuel. NE remains committed to ensuring that our Nation's options for safe nuclear power remain open.

Domestically this has been an historic year for nuclear energy. Late last year the Westinghouse AP1000 passively safe reactor received design certification from the NRC. The NP 2010 program, which was supported strongly by this committee, was instrumental in achieving this success.

Then on February 9th, the NRC approved the combined construction and operating license for two AP1000 reactors at the Vogtle nuclear plant. That vote authorized construction of the Nation's first new nuclear reactor since 1978. With construction of two units at Vogtle, the anticipated two units at Summer, and four units in China, literally tens of thousands of U.S. workers will be supporting AP1000 construction projects. As Secretary Chu noted at Vogtle three weeks ago, the resurgence of nuclear energy starts here in Georgia.

With the support of Congress, the Department has also taken the first steps to accelerate commercialization of small modular reactors, or SMRs. In my view, SMRs could enable a new paradigm for small nuclear power plants. On January 20, NE released a draft Funding Opportunity Announcement soliciting input from industry toward establishing cost-shared agreements to support design certification and licensing. The Department is currently reviewing the comments on that draft and will issue the final procurement very soon.

On January 26th, the Blue Ribbon Commission released its final report providing recommendations for managing the back end of the nuclear fuel cycle. The administration commends the Commission for its work over the past 2 years. Secretary Chu has created an internal task force that I lead to assess the Commission's recommendations and develop a strategy that builds off of their work. The administration will work with Congress to define a responsible and achievable path forward to manage our Nation's used nuclear fuel and nuclear waste.

And last, November 26th, the Mars Science Lab lifted off from Cape Canaveral, carrying a Radioisotope Thermal Generator to power the Curiosity rover. That event marked the 50th anniversary of the use of nuclear power in space exploration.

As the President emphasized in his State of the Union Address, this country needs an all-out, all-of-the-above strategy that develops every available source of American energy. And as Secretary Chu stated during his recent trip to Vogtle, nuclear energy is a critical part of President Obama's all-of-the-above strategy. Nuclear energy currently supplies over 70 percent of our Nation's carbon-free electricity and will continue to play an integral role in our Nation's energy mix. My office will continue to explore the avenues that offer the highest probability for nuclear power to fulfill this role.

The President's fiscal year 2013 budget requests $770 million for the Office of Nuclear Energy. That is a 10 percent decrease from the fiscal year 2012 appropriation. Of that total, $314 million is for research, development and demonstration. The decrease in those areas is about 17 percent. This austere budget required extremely careful prioritization and some very tough decisions on very important programs.

I look forward to your questions.

Mr. FRELINGHUYSEN. Thank you, Mr. Secretary.

[The information follows:]

Statement of Peter Lyons
Assistant Secretary for Nuclear Energy
U.S. Department of Energy
Before the
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives

FY 2013 Appropriations Hearing
March 7, 2012

Chairman Frelinghuysen, Ranking Member Visclosky and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the President's fiscal year 2013 budget request for the Office of Nuclear Energy (NE) at the Department of Energy.

When I testified before you last year, the events at Fukushima were still unfolding. Over the last year, the Nuclear Regulatory Commission (NRC) has undertaken a significant review of the events at Fukushima and how they may affect nuclear plant operations in the U.S. NE has revaluated its R&D activities in light of these events to continue to support the safety of operating and future plants. We are working to develop fuels with enhanced accident tolerance. We are using modeling and simulation to better understand operations in off-normal conditions, how nuclear plants respond to seismic events and how reactor materials evolve over time. Through the Nuclear Energy University Program, we are enlisting the help of the university communities to focus on safety- related R&D projects including such issues as the safe storage of used fuel. NE remains committed to ensuring that the option for safe nuclear power remains open to the nation.

Domestically, this has been a historic year for nuclear energy. Late last year, the Westinghouse AP1000 reactor received design certification from the NRC. On February 9, 2012, the NRC voted to approve issuance of a combined operation and construction license for two new units at the Vogtle nuclear power plant in Georgia. The vote authorizes construction of the Nation's first new commercial nuclear reactor since 1978.

With the support of Congress, the Department has also taken the first step to accelerate the commercialization of Small Modular Reactors (SMRs). If industry chooses to deploy this technology, SMRs could help meet the nation's economic, energy security and climate change goals. On January 20, 2012, NE released a draft Funding Opportunity Announcement (FOA), soliciting input from industry to establish cost-shared agreements for first-of-a-kind engineering to support design certification and licensing of SMRs. The Department is currently reviewing the submitted comments and looks forward to releasing the final FOA in the coming weeks.

On January 26, 2012, the Blue Ribbon Commission on America's Nuclear Future released its final report, providing recommendations for managing the back end of the nuclear fuel cycle. The Commissioners worked collaboratively and constructively through a public, open and transparent process. The

Administration commends the Commission for its work over the past two years. Secretary Chu has created an internal task force to assess the Commission's recommendations and develop a strategy that builds off their work. The Administration will work with Congress to define a responsible and achievable path forward to manage our nation's used nuclear fuel and nuclear waste.

On November 26, 2011, the Mars Science Laboratory rover lifted off from Cape Canaveral, carrying a Radioisotope Thermal Generator power source to enable the Curiosity rover mission. This year marked the 50th anniversary of the use of nuclear power for space exploration, which has made some of the most complex and challenging missions possible.

As the President emphasized in his State of the Union Address, "this country needs an all-out, all-of-the-above strategy that develops every available source of American energy." And as Secretary Chu stated during his recent trip to the Vogtle plant, "Nuclear energy is a critical part of President Obama's all-of-the-above energy strategy." Nuclear energy currently supplies over 70 percent of our nation's carbon-free electricity and will continue to play an integral role in our nation's energy mix. NE will explore the avenues that offer the highest probability of nuclear power fulfilling this role.

While new builds of nuclear power, as well as other clean energy sources, are challenged by the current low price of natural gas, I've already described many exciting developments that are expected to help enable a strong future for nuclear power.

The President's fiscal year 2013 budget requests $770.4 million for the Office of Nuclear Energy, a decrease of 10.3 percent from the FY 2012 appropriation. Of the $770.4 million, $314.4 million is for research, development and demonstration. This austere budget required extremely careful prioritization.

OFFICE OF NUCLEAR ENERGY (NE) PROGRAMS

SMR Licensing Technical Support - $65.0 million

The SMR Licensing Technical Support program is designed to support first-of-a-kind engineering activities for design certification and licensing activities for two SMR designs through cost-shared arrangements with industry partners in order to promote accelerated deployment of these technologies. The acceleration provided by the cost-shared funding is expected to improve U.S. global competitiveness, enhance domestic energy security and contribute to meeting greenhouse gas reduction goals. The program will help demonstrate the potential of the nascent SMR technology and encourage new competition in the marketplace. The program involves providing cost-shared support for two teams of specific reactor technology vendors for the design, engineering, testing, analysis related to a design certification application for each vendor's reactor system and specific utilities or consortia for the development of a license application specific to the chosen sites.

Reactor Concepts - Research, Development and Demonstration- $73.7 million

The Reactor Concepts Research, Development and Demonstration (RD&D) program is designed to develop new and advanced reactor designs and technologies that enable improved competitiveness and help to advance nuclear power as a resource capable of meeting the Nation's energy, environmental and national security needs. R&D activities are designed to address technical, cost, safety and security issues associated with reactor concepts including advanced SMR designs, the Next Generation Nuclear Plant (NGNP) and other advanced reactor concepts. Additionally, we will conduct R&D on advanced technologies to support possible life extensions of Light Water Reactors (LWRs) and address the impacts of the Fukushima accident with a focus on further improving safety of LWRs by enhancing their accident tolerance.

Small Modular Reactor Advanced Concepts R&D- $18.5 million

The SMR Advanced Concepts R&D subprogram is designed to support the development of innovative SMR designs that may offer improved safety, functionality and affordability, incorporating the existing or advanced nuclear technology and operating experience base. The program supports laboratory/university and industry projects to conduct nuclear technology R&D that would be useful to support development of advanced SMR concepts for use in the mid-to long-term. Emphasis is on advanced reactor technologies that offer simplified operation and maintenance for distributed power applications and increased proliferation resistance and security.

Next Generation Nuclear Plant Demonstration Project- $21.2 million

The NGNP project is designed to investigate the technical viability of very high temperature nuclear reactor (VHTR) technology to provide more efficient carbon-free electricity and high-temperature process heat for a variety of industrial uses. In October 2011, the Secretarial Determination was made not to proceed with Phase 2 design activities at this time. However, the program will continue to focus on R&D in the near term. The Department continues to work with the U.S. private sector to understand industrial end-user requirements, produce trade studies evaluating the integration of NGNP into various industrial applications and develop consider partnership opportunities with appropriate cost-sharing strategies to support industry in their efforts to commercialize VHTR technologies.

Light Water Reactor Sustainability- $21.7 million

This program will conduct R&D to explore extending the operating lifetime of current plants beyond 60 years and, where possible, enable further improvement in their safety and productivity. The program will partner with industry and work with the NRC to conduct the long-term research needed to inform major component refurbishment and replacement strategies, performance enhancements and plant license extensions. The research will focus on aging phenomena and issues that require long-term research that affect the existing fleet of both boiling and pressurized water reactors and will also address post-Fukushima lessons learned, in particular, research to enhance the accident tolerance of light water reactors, accident response analysis capabilities and emerging issues. Because industry has a significant financial incentive to extend the life of existing plants, the Department will work to ensure that activities are cost-shared to the maximum degree possible.

Advanced Reactor Concepts - $12.4 million

This program is designed to develop and refine future reactor concepts that could dramatically improve nuclear power performance including sustainability, economics and safety and proliferation resistance. The program will continue support for international activities in the Generation IV International Forum and international collaborations on advanced reactor operations and safety.

The key R&D needs are being addressed for two high priority advanced concepts: liquid metal-cooled fast reactors and liquid fluoride salt cooled reactors. In addition, R&D that could provide wide benefits (e.g., development of advanced energy conversion technology such as a supercritical CO2 Brayton cycle) is being pursued with a view to application in many different reactor technologies. The Advanced Reactor Concepts program will continue to solicit and evaluate new ideas in order to encourage innovation, incorporation of technology advances and to enhance the safety, as well as performance, of these systems.

Fuel Cycle Research and Development- $175.4 million

The mission of the Fuel Cycle R&D program is to develop sustainable fuel cycles as described in the *Office of Nuclear Energy's Research and Development Roadmap.* Specifically, the program will develop a suite of options that will enable future policy-makers and stakeholders to make informed decisions about how best to manage used fuel from reactors. A long-term, science-based approach is employed to foster innovative, transformational technology solutions to achieve the mission.

Advanced Fuel Research and Development- $40.4 million

The development of advanced fuels may be an essential part of achieving a sustainable fuel cycle. We are pursuing two major paths: (1) the development of next generation light water reactor fuels with enhanced accident tolerance and (2) development over the long term of transmutation fuels with enhanced proliferation resistance and resource utilization. This activity also supports NE's international fuel development cooperation activities and university commitments.

Used Nuclear Fuel Disposition Research and Development - $59.7 million

The Used Nuclear Fuel Disposition subprogram will identify alternatives and conduct scientific research and technology development to enable long-term storage, transportation and geologic disposal of used nuclear fuel and waste generated by existing and future nuclear fuel cycles. There are a number of key elements that the Department has recognized as foundational to the nation's used fuel management and high-level waste disposal program, and has been pursuing even prior to the recommendations recently put forward by the Blue Ribbon Commission on America's Nuclear Future. The Commission's recommendations for research and development-related near-term priorities align with the funding allocations within the Used Nuclear Fuel Disposition subprogram. The FY 2013 request builds upon the FY 2012 activities by focusing on evaluating consolidated interim storage and transportation issues (focused initially on decommissioned sites); working with industry to develop standardized cask systems for used fuel management; conducting material testing to support extended storage of used fuel; revisiting and preparing a report on plans to address recommendations identified by the National Academy of Sciences transportation report; and initiating research on generic geologic disposal environments (e.g. system modeling, engineered barriers, natural barriers, evaluation of design concepts and experiments). Of the $60 million requested, $10 million would be derived from the Nuclear Waste Fund to be used consistent with the Nuclear Waste Policy Act.

Fuel Resources - $6.7 million

For nuclear energy to remain a sustainable energy source, there must be assurance that an economically viable supply of nuclear fuel is available. The availability of fuel resources for each potential fuel cycle and reactor deployment scenario must be understood. Most appropriate for federal involvement in this area is research and development to support investigation of long term, "game-changing" approaches such as the recovery of uranium from seawater.

Nuclear Energy Enabling Technologies- $65.3 million

The Nuclear Energy Enabling Technologies (NEET) program is designed to conduct R&D in crosscutting technologies that directly support and enable the development of new and advanced reactor designs and fuel cycle technologies

Crosscutting Technology Development- $26.2 million

The NEET program includes the following elements: (1) Reactor Materials (materials for nuclear applications); (2) Advanced Sensors and Instrumentation; (3) Advanced Modeling and Simulation; (4) Advanced Methods for Manufacturing; and (5) Proliferation and Terrorism Risk Assessment. In FY 2013, the funding activities will be in the first three elements: Reactor Materials, Advanced Sensors and Instrumentation and Advanced Modeling and Simulation. Some of the research in the last two elements, Advanced Methods for Manufacturing and Proliferation Risk Assessment, will be funded through Nuclear Energy University Program (NEUP) awards. An on-going National Academy study on Proliferation Risk Assessment is also funded in Crosscutting Technology Development.

Energy Innovation Hub for Modeling and Simulation- $24.6 million

The Energy Innovation Hub for Modeling and Simulation (Hub) is creating a virtual reactor model of actual Tennessee Valley Authority-owned (TVA), Westinghouse-designed, operating pressurized water reactors (PWRs) that will be able to simulate reactor behavior. Engineers will be able to use this virtual model to improve the safety and economics of reactor operations by simulating off-normal conditions as well as reactor power production increases and reactor life and license extensions. The combination of data gained from the virtual model and the physical reactor will be used to resolve technology issues confronting nuclear energy development. The Hub will also serve to educate today's reactor engineers in the use of advanced modeling and simulation through direct engagement in Hub activities. The Oak Ridge National Laboratory is leading a consortium (CASL – Consortium for Advanced Simulation of Light

Water Reactors) of national labs, universities and industry partners to manage Hub execution. CASL began operations in late June 2010.

National Scientific User Facility- $14.6 million

The National Scientific User Facility (NSUF) promotes the use of unique nuclear research facilities for science-based experiments to encourage active university, industry and laboratory collaboration in relevant nuclear scientific research. The Idaho National Laboratory Advanced Test Reactor and post-irradiation examination (PIE) facilities of the Center for Advanced Energy Sciences and Materials and Fuels Complex are available as user facilities. In addition, research reactors at Oak Ridge National Laboratory, the Massachusetts Institute of Technology and North Carolina State University, the Advanced Photon Source beam line capabilities at the Illinois Institute of Technology and examination facilities at the Universities of Wisconsin, Michigan, California-Berkeley and Nevada-Las Vegas, are partnered with the NSUF bringing additional user facilities to the research community.

International Nuclear Energy Cooperation - $3.0 million

The International Nuclear Energy Cooperation's (INEC) mission is to serve as the overall lead for all NE international activities, including analysis, development and implementation of international civil nuclear energy policy and coordination and integration of NE's international nuclear technical activities. These activities support international bilateral and multilateral engagement and civil nuclear energy R&D activities with countries with an established or planned civilian nuclear power sector.

INEC provides NE the ability to meet growing demands for engagement with international partners on civil nuclear policy, R&D and related activities. INEC engages both bilaterally and multilaterally to support broader U.S. policy and commercial goals related to nuclear energy globally and will allow more effective integration of NE international R&D and policy interests. INEC also coordinates NE efforts with the Department's National Nuclear Security Administration, Office of Environmental Management and Office of Policy and International Affairs; the National Security Council; Department of State; Department of Commerce; and the Nuclear Regulatory Commission to facilitate U.S. nuclear energy R&D, policy and commercial interests internationally.

Radiological Facilities Management- $51.0 million

Radiological Facilities Management (RFM) maintains NE-managed nuclear facilities at the Idaho National Laboratory; supports nuclear facilities providing NE mission support at Oak Ridge National Laboratory, Los Alamos National Laboratory and Sandia National Laboratories; and, through the Research Reactor Infrastructure subprogram provides fresh reactor fuel to and removes used fuel from 26 operating university reactors. RFM's Space and Defense Infrastructure sub-program ensures that the United States' radioisotope power systems capabilities are maintained and operated in a safe, environmentally-compliant and cost-effective manner to support space exploration missions and certain national security applications.

Idaho Facilities Management- $152.0 million

The Idaho Facilities Management (IFM) program maintains DOE mission-supporting facilities and capabilities at Idaho National Lab (INL) to support the Department's nuclear energy research, testing of naval reactor fuels and reactor core components and a range of national security technology programs that support the National Nuclear Security Administration and other Federal agencies such as the Department of Homeland Security in the areas of critical infrastructure protection and nuclear nonproliferation.

The IFM program enables long-term nuclear R&D activities by providing the people, facilities, equipment and nuclear materials necessary to conduct a wide array of experimental activities. The Advanced Test Reactor (ATR) provides unique irradiation capability to further nuclear fuel and reactor component research in support of advanced nuclear reactor design activities. The Materials and Fuels Complex (MFC) contains a comprehensive range of fuel and experiment fabrication and pre- and post-irradiation examinations, to assess material and fuel characteristics and performance in varying reactor environments. We are currently reviewing options for expanding our ability to provide transient testing of advanced reactor fuels, particularly in light of Fukushima, potentially through the re-activation of MFC's Transient Reactor Test Facility (TREAT).

Two new line items are initiated in FY 2013. Project 13-D-905, Remote-Handled Low-Level Waste Disposal Project, Idaho National Laboratory, is a jointly funded, compliance-driven project with the National Nuclear Security Administration's Office of Naval Reactors to provide ongoing on-site disposal of remote-handled low-level waste generated at INL. Project 13-E-200, Advanced Post-Irradiation Examination Capabilities Project will analyze options for and design of, a potential future facility to support modern, state-of-the-art advanced post-irradiation examination capabilities on a larger scale.

Idaho Sitewide Safeguards and Security- $95.0 million

The Idaho Sitewide Safeguards and Security (S&S) program supports the INL complex nuclear facility infrastructure and enables NE to conduct research and development in support of multiple program missions. In an effort to better align the S&S funding with INL infrastructure and R&D programs, the S&S program is being requested under the Nuclear Energy appropriation in FY 2013.

The S&S program funds all physical and cyber security activities for the INL, providing protection of DOE nuclear materials, classified and unclassified matter, Government property, personnel and other vital assets from theft, diversion, sabotage, espionage, unauthorized access, compromise and other hostile acts that may cause unacceptable adverse impacts on our national security; program continuity; or the health and safety of employees, the public, or the environment.

In addition to NE's R&D activities, S&S enables a range of national security technology programs that support the National Nuclear Security Administration (NNSA) and other Federal agencies including the Department of Homeland Security in the areas of critical infrastructure protection and nuclear nonproliferation. Safeguards and security functions are also provided through the INL S&S program, which supports the Department of the Army, the Department of the Navy and NNSA Naval Reactors missions.

Program Direction - $90.0 million

Program Direction provides the federal staffing resources and associated costs required to provide overall direction and execution of NE's missions and responsibilities. Included is funding for federal personnel from NE; coordination of the Energy portfolio by the Office of the Under Secretary for Energy; and the Office of the General Counsel and Energy Information Administration responsible for administrative and judicial litigation associated with ending of the Yucca Mountain Repository project, legal issues related to the standard contract and the Department's responsibilities regarding spent fuel and high level waste as specified by the Nuclear Waste Policy Act (NWPA).

The Program Direction request reflects NE's continued efforts to optimize support for its federal workforce, while continuing to improve efficiency and cost-effectiveness and ensure the expert federal management and oversight of NE mission activities. Currently, 27 percent of the NE workforce is eligible to retire and an additional five percent will be eligible by the end of fiscal year 2013, presenting a significant challenge to succession planning. Over the past several years, NE has been addressing the issue of an aging workforce through the recruitment of appropriately skilled entry-level engineering, scientific and administrative positions. The fiscal year 2013 request for Program Direction is effectively flat-lined from fiscal year 2012, reflecting efficiencies to be realized in all activity areas.

Mr. FRELINGHUYSEN. Mr. Jaczko.

Mr. JACZKO. Thank you.

Mr. FRELINGHUYSEN. Thank you for being here.

Mr. JACZKO. Thank you. And I would like to say on behalf of the agency to offer my sympathies and the agency's sympathies to Congressman Visclosky as well.

Mr. Chairman, Ranking Member Pastor, and members of the subcommittee, I am honored to appear before you today to discuss the fiscal year 2013 budget request for the U.S. Nuclear Regulatory Commission. As you know, the NRC is an independent Federal agency established to license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. We have formulated our fiscal year 2013 budget to support the agency's safety and security strategic goals and outcomes.

The NRC's safety goal is to assure adequate protection of public health and safety and the environment. Our safety program outcomes are to prevent the occurrence of any nuclear reactor accident, inadvertent criticality events, acute radiation exposures, or significant releases of radioactive materials. The security goal is to ensure the secure use and management of radioactive materials with outcomes of preventing any instances where licensed radioactive materials are used in a malicious manner, and to thwart attempts to sabotage licensed facilities and divert special nuclear material.

In fulfilling its responsibilities for the protection of public health and safety, the NRC develops regulations and guidance for applicants and licensees; licenses or certifies applicants to use nuclear materials, operate nuclear facilities, and decommission facilities. And we inspect and assess licensee operations and facilities to ensure that they comply with NRC requirements, taking appropriate follow-up or enforcement actions when necessary.

I am very, very proud that once again the NRC scored among the top tier of Federal agencies in the 2011 Best Places to Work in the Federal Government rankings, and this was in a year in which we had a number of significant challenges. As many of you have mentioned, the Fukushima accident was a significant challenge for the agency, as well as multiple natural disasters in the United States, including flooding in the Midwest in June, and the earthquake on the east coast in August, and other serious natural hazards such as hurricanes and tornados which had an impact on nuclear facilities. Given those challenges it was a particularly significant recognition for the agency, and I am extremely proud of the outstanding job that the NRC staff has done and continues to do to fulfill our important health and safety mission.

The agency's focus on improved budget execution strategy has resulted in a significant decrease in our unobligated carryover. Between fiscal years 2009 and 2011, the NRC has reduced total unobligated carryover by 45 percent, from 71 million in fiscal year 2009 to 32 million in fiscal year 2011. We are down to a level now of approximately 3 percent of the agency's total annual appropriation.

The NRC's fiscal year 2013 budget request provides the necessary resources for our Nuclear Reactor Safety and Nuclear Materials and Waste Safety Programs to carry on our mission on behalf of the American people. The NRC's proposed budget in fiscal year 2013 is approximately $1.050 billion, including nearly 4,000 full-time equivalents. And this is approximately an increase of $15 million over our fiscal year 2012 enacted budget and a decrease of 25 full-time equivalents. I am pleased to say that this reduction in staffing was primarily the result of the agency's focus on improving our efficiencies in administrative support areas and enhancing efficiencies and effectiveness.

Also included in our budget is the Office of Inspector General's component, which is a proposed budget of $11 million. This includes resources to carry out the IG's mission to independently and objectively conduct audits and investigations to ensure the efficiency and integrity of NRC programs and operations and to promote cost-effective management.

In accordance with the Omnibus Budget Reconciliation Act of 1990, the NRC's budget request provides for 90 percent fee recovery in general, less amounts appropriated for waste incidental reprocessing activities and generic homeland security activities. So accordingly, $925 million of the fiscal year 2013 budget will be recovered from fees assessed to NRC licensees. This results in a net appropriation of $129 million, which is approximately the same as our fiscal year 2012 enacted budget. Consistent with OMB's guidance, the NRC's budget request also includes a 0.5 percent pay raise for our staff.

So, Mr. Chairman, Ranking Member, and members of the subcommittee, this concludes my formal testimony, and I look forward to answering any questions that you may have. Thank you.

Mr. FRELINGHUYSEN. Okay. Thank you, Mr. Jaczko.

[The information follows:]

WRITTEN STATEMENT
BY GREGORY B. JACZKO, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
MARCH 7, 2012

Mr. Chairman, Ranking Member, and Members of the Subcommittee, I am honored to appear before you today to discuss the Fiscal Year (FY) 2013 budget request for the U. S. Nuclear Regulatory Commission (NRC) and to respond to any questions that you may have.

The U.S. Nuclear Regulatory Commission (NRC) is an independent Federal agency established to license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials (SNM) to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The NRC has formulated its Fiscal Year (FY) 2013 Congressional Budget Justification to support the agency's safety and security strategic goals and outcomes.

The NRC's safety goal is to ensure adequate protection of public health and safety and the environment. The agency's safety program outcomes are to prevent the occurrence of any nuclear reactor accidents, inadvertent criticality events, acute radiation exposures, or significant releases of radioactive materials. The security goal is to ensure the secure use and management of radioactive materials. The security program outcomes are to prevent any instances where licensed radioactive materials are used in a malicious manner and to thwart attempts to sabotage licensed facilities or divert special nuclear material.

To fulfill its responsibility to protect public health and safety, the NRC performs the following regulatory functions: developing regulations and guidance for applicants and licensees; licensing or certifying applicants to use nuclear materials, operate nuclear facilities, and decommissioning facilities; inspecting and assessing licensee operations and facilities to ensure that licensees comply with NRC requirements and taking appropriate follow-up or enforcement actions when necessary; evaluating operations experience of licensed facilities and activities; and conducting research, holding hearings, and obtaining independent reviews to support regulatory decisions.

I am very proud that the NRC once again scored among the top tier of Federal agencies in the 2011 Best Places to Work in the Federal Government rankings. Since 2011 was a very challenging year for the NRC, especially with the Fukushima-Daiichi emergency in Japan, the ranking was a particularly significant recognition for the agency. I am extraordinarily proud of the outstanding job that the NRC staff has done, and continues to do, to ensure the public health and safety.

Additionally, the agency's focus on improved budget execution strategy has resulted in a significant decrease in unobligated carryover. Between FY 2009 and FY 2011 the NRC reduced total unobligated carryover by 45% from $71.7 million in FY 2009 to $32.3 million in FY 2011. This represents approximately 3% of the agency's total annual appropriation.

Specifics of the FY 2013 Budget Request

The NRC's FY 2013 Congressional Budget Justification provides the necessary resources for the Nuclear Reactor Safety and Nuclear Materials and Waste Safety Programs to carry out the agency's mission and achieve the stated goals and desired outcomes for the American public. The NRC's proposed FY 2013 budget is $1,053 million, including 3,951 full-time equivalents (FTE), which represents an increase of $15 million, and a decrease of 25 FTE, when compared with the FY 2012 enacted budget. The FTE reduction is primarily in the administrative support areas (financial management, human resources management, IT/IM, administration) as a result of the agency's focus on optimizing its business practices to achieve efficiencies and enhance corporate effectiveness.

The Office of the Inspector General's component of the FY 2013 proposed budget is $11 million and includes resources to carry out its mission to independently and objectively conduct audits and investigations to ensure the efficiency and integrity of NRC programs and operations and to promote cost-effective management.

Pursuant to the provisions of the Omnibus Budget Reconciliation Act of 1990, as amended, the NRC's FY 2013 budget provides for 90 percent fee recovery, less the amounts appropriated for (1) Waste Incidental to Reprocessing Activities under Section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 and (2) generic homeland security activities.

Accordingly, $925 million of the FY 2013 budget will be recovered from fees assessed to NRC licensees. This will result in a net appropriation of $129 million, which is level with the FY 2012 enacted budget. Consistent with OMB guidance, the NRC's FY 2013 budget request includes a 0.5 percent pay raise.

Nuclear Reactor Safety

The Nuclear Reactor Safety Program encompasses NRC efforts to license, regulate, and oversee civilian nuclear power, research, and test reactors in a manner that adequately protects public health and safety and the environment. This program also provides high assurance of the physical security of facilities and protection against radiological sabotage. This program contributes to the NRC's safety and security goals through the activities of the Operating Reactors and New Reactors Business Lines that regulate existing and new nuclear reactors to ensure their safe operation and physical security.

Overall resources requested in the FY 2013 budget for the Nuclear Reactor Safety Program are $810 million, including 3,000 FTE. This funding level represents an overall increase of $10 million when compared with the FY 2012 enacted budget. Funding also includes approximately $10 million to support the implementation of the Near-Term Task Force's recommendations.

Operating Reactors

The Operating Reactors Business Line supports the licensing, oversight, rulemaking, international activities, research, and event response associated with the safe and secure operation of 104 civilian nuclear power reactors and 31 research and test reactors (RTRs). The FY 2013 budget request for Operating Reactors is $545 million, including 2,075 FTE. This represents an overall funding increase of $10 million, including a decrease of 26 FTE, when compared with the FY 2012 enacted budget. The major activities that the requested resources will support include the following:

- Conduct activities in response to the Fukushima lessons learned and long-term review.
- Conduct technical review for 950 licensing actions, including the review of approximately 11 power up-rates and approximately 25 ongoing National Fire Protection Association 805 reviews for the approximately 45 reactors that will be in transition to a risk-informed, performance-based set of requirements.
- Continue review of eight license renewal applications and three new applications.
- Conduct 10 high-priority rulemaking activities, support review of approximately 15 petitions for rulemaking (PRMs), including issuance of five closure packages.
- Conduct critical Research and Test Reactor project management functions pertaining to license renewal applications.
- Continue inspection activities for the 104 operating nuclear power plants, including the component design-basis inspections, fire protection inspections, and generic issues inspections (approximately 100 per year).
- Continue resident inspector initiative to maintain an experienced and stable onsite inspection presence of qualified resident inspectors at the 104 nuclear power plants.
- Conduct domestic and international security reviews and support for screening of approximately 3,000 national and international operational events with detailed evaluation of approximately 200 of those events.
- Evaluate licensee emergency preparedness during biennial exercises that include assessment of offsite response activities by the Federal Emergency Management Agency.

New Reactors

The New Reactors Business Line supports the licensing, oversight, rulemaking, international activities, and research associated with the safe and secure development of new power reactors from design, site approval, and construction to operational status. The FY 2013 budget request for New Reactors is $265 million, including 925 FTE. This is approximately the same as the FY 2012 enacted budget. The major activities that the requested resources will support include the following:

- Perform licensing and hearing support for review of 10 combined operating licenses (COLs).
- Continue review of two new design certifications (DCs); continue review of one DC renewal; and start the review of three new DCs.
- Review two early site permit applications and begin review of two new applications expected in FY 2013.
- Support licensing amendment requests for post-COL activities. The NRC expects that at least 10 percent of amendments will be for design changes associated with resolving first-of-a-kind construction issues.
- Provide oversight of six reactors expected to be under construction.
- Continue inspection of construction and preoperational testing activities for Watts Bar 2 to support decision on operation in FY 2013.
- Perform work on three high-priority rulemakings and one medium-priority rulemaking.
- Perform work associated with advanced reactor technologies and preapplication reviews for small modular reactors.

NUCLEAR MATERIALS AND WASTE SAFETY

The Nuclear Materials and Waste Safety Program encompasses the NRC's effort to license, regulate, and oversee nuclear materials and waste in a manner that adequately protects public health and safety and the environment. This program provides high assurance of physical security of the most risk-significant materials and waste and protection against radiological sabotage, theft, or diversion of nuclear materials.

Through this program, the NRC regulates uranium processing and fuel facilities; research and pilot facilities; nuclear materials users (medical, industrial, research, academic); spent fuel storage; spent fuel storage casks and transportation packaging; decontamination and decommissioning of facilities; and low-level and high-level radioactive waste. The program contributes to the NRC's Safety and Security goals through the activities of the Fuel Facilities, Nuclear Materials Users, Spent Fuel Storage and Transportation, and Decommissioning and Low-Level Waste Business Lines regulating byproduct, source, and SNM.

Overall resources requested in the FY 2013 budget for the Nuclear Materials and Waste Safety Program are $232 million, including 870 FTE. This funding level represents an overall funding increase of $5 million when compared with the FY 2012 enacted budget.

Fuel Facilities

The Fuel Facilities Business Line supports licensing, oversight, rulemaking, international activities, research, generic homeland security, and event response associated with the safe and secure operation of various operating and new fuel facilities such as conversion, enrichment, and fuel fabrication facilities, and nuclear fuel research and pilot facilities. The FY 2013 budget request for Fuel Facilities is $56 million, including 227 FTE. The major activities that the requested resources will support include the following:

- Conduct licensing and oversight activities associated with fuel facilities and licensees with greater than critical mass quantities of SNM.
- Operate and maintain the Nuclear Material Management and Safeguards System database and the Nuclear Materials Information Program.
- Perform emergency preparedness, security, and licensee performance reviews.

- Conduct licensing, certification, inspection, oversight, environmental review, research, adjudicatory, enforcement, allegation, and other regulatory activities associated with new and operating fuel facilities, including uranium conversion and enrichment and fuel fabrication.
- Provide significant oversight of construction activities at numerous fuel facilities.
- Improve the fuel cycle oversight process and infrastructure to make them more effective, efficient, risk-informed, performance-based, transparent, and predictable.

Nuclear Materials Users

The Nuclear Materials Users Business Line supports the licensing, oversight, rulemaking, international activities, research, event response, and Agreement State activities associated with the safe and secure possession, processing, handling, and use of nuclear materials for the many and diverse uses of these materials. The FY 2013 budget request for Nuclear Materials Users is $93 million, including 342 FTE, reflecting a flat budget when compared with the FY 2012 enacted budget. The major activities that the requested resources will support include the following:

- Complete 2,500 materials licensing actions and 1,000 routine health and safety inspections. Conduct event evaluation, research, incident response, allegation, investigations, enforcement, and rulemaking activities to maintain the regulatory safety and security infrastructure needed to process and handle nuclear materials.
- Perform materials activities related to State, Tribal, and Federal programs, including oversight, technical assistance, regulatory development, and cooperative efforts.
- Operate the National Source Tracking System (NSTS), a secure, Web-based, nationalized central registry designed to enhance the accountability for radioactive sources.
- Provide maintenance and operation support for the Integrated Source Management Portfolio, which includes three core systems (NSTS, Web-Based Licensing, and License Verification System) to track risk significant sources and other radioactive materials.
- Conduct Integrated Materials Performance Evaluation Program reviews (10–12), continue outreach to potential new Agreement States and process new agreements (1), and process Agreement State incidents or events (50).
  Complete reviews and make decisions on import/export authorizations of nuclear components and radiological materials.
- Conduct investigations of wrongdoing, materials-related enforcement actions, oversight of the Alternative Dispute Resolution and Allegation Programs, and external safety culture program activities.

Spent Fuel Storage and Transportation

The Spent Fuel Storage and Transportation Business Line supports the licensing, oversight, rulemaking, international activities, research, and event response associated with the safe and secure storage and transportation of spent nuclear fuel (SNF). The FY 2013 budget request for Spent Fuel Storage and Transportation is $45 million, including 162 FTE. This represents an overall funding increase of approximately $4 million when compared with the FY 2012 enacted budget. The major activities that the requested resources will support include the following:

- Review license requests for site-specific independent spent fuel storage installations (ISFSIs), storage and transport cask designs, transportation security plans, and route approvals to support safe and secure domestic and international transportation of radioactive materials, regulatory requirements for full-core offload capability at operating reactor sites, and transfer of spent fuel to ISFSIs to support reactor decommissioning.
- Identify and implement regulatory improvements to the proficiency and effectiveness of the licensing, inspection, and enforcement programs associated with the storage and transportation of SNF.
- Inspect storage cask and transportation cask vendors, fabricators, and designers and ISFSI pad construction, dry-run operations, initial loading operations and routine operations to ensure safety.
- Resolve technical issues associated with allowance of burnup credit for transportation and storage casks and the transportation and storage of high-burnup fuels (greater than 45 gigawatt-days/metric tons of uranium).
- Develop and execute a plan to develop a long-term waste confidence rule for the handling and extended storage of SNF for more than 60 years after a reactor's licensed life.
- Identify and resolve regulatory issues associated with extended storage and transportation of SNF and initial development of a licensing regulatory framework to accommodate alternative geologic disposal or other disposition options in response to changes in the national program for high-level waste management.
- Conduct rulemaking efforts on ISFSIs that will provide consistent regulation for the various types and locations.
- Coordinate with domestic and international partners on the safety and security of storage and transport.

Decommissioning and Low-Level Waste

The Decommissioning and Low-Level Waste Business Line supports the licensing, oversight, rulemaking, international activities, and research associated with the safe and secure operation of uranium recovery facilities, removal of a nuclear facility from service and reduction of residual radioactivity to a level that permits release of the property and termination of the NRC license, and the disposition of low-level radioactive waste from all civilian sources. The FY 2013 budget request for Decommissioning and Low-Level Waste is $38 million, including 139 FTE. This represents an overall funding increase of about $1 million when compared with the FY 2012 enacted budget. The major activities that the requested resources will support include the following:

- Conduct project management and technical reviews for decommissioning activities for 13 power and early demonstration reactors, 9 RTRs, 22 decommissioning complex materials facilities, and 38 decommissioning uranium recovery facilities.
- Work on 8 environmental and 11 safety reviews (hearings included) of applications, as well as licensing activities associated with 14 operating uranium recovery facilities.
- Provide assistance to the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency, the IAEA's Waste Safety Standards Committee, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management for the preparation and updating of safety guides and standards.
- Provide oversight of certain U.S. Department of Energy waste determination activities and plans consistent with the NRC's responsibilities in the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 to conduct Waste Incidental to Reprocessing activities.

Mr. Chairman, Ranking Member, and Members of the Subcommittee, this concludes my formal testimony on the NRC's FY 2013 budget request. On behalf of the Commission, thank you for the opportunity to appear before you. I look forward to continuing to work with you to advance the NRC's important safety mission. I would be pleased to respond to any questions that you may have. Thank you.

Mr. FRELINGHUYSEN. Mr. Secretary, you have made, obviously, some very supportive comments about nuclear energy. The President has, Secretary Chu has, but there seems to be quite a gap between rhetorical support and support as reflected in your budget. You have reduced funding for the nuclear energy research programs by 12 percent, $95 million. Tell us about that reduction.

Dr. LYONS. Well, I believe, as I indicated in my remarks, Mr. Frelinghuysen, the Office of Nuclear Energy was assigned a very austere target for its budget for fiscal year 2013. We have made very difficult prioritization decisions to stay within that budget. I have placed particular emphasis on maintaining progress towards small modular reactors——

Mr. FRELINGHUYSEN. We are going to talk about that.

Dr. LYONS [continuing]. Continuing progress in areas of used fuel disposition, and continuing work on enhanced accident-tolerant fuels. There are several other areas like the Hub that we have also worked very hard to keep as well funded as possible. But it has definitely led to very severe prioritization decisions and reductions in a number of areas.

Mr. FRELINGHUYSEN. So indeed, the rhetoric which is positive, which I share in support for more nuclear power for our country, is not being met by your budget submission. And if we were to provide you with some additional dollars, how would you use them?

Dr. LYONS. I would be happy to provide for the record a set of suggestions based on any increment that you might request that we explore, sir.

Mr. FRELINGHUYSEN. Mr. Secretary, clearly some of the programs proposed by your Department in recent years support, obviously, our American manufacturing in the nuclear sector. The Small Modular Reactor Program, for example, which you have mentioned and you and I have discussed, is important for this and for other reasons as the smaller reactor vessels would allow much more of the reactor components to be made here at home.

At the same time, the budget request reduces funding for the 1-year-old Cross-Cutting Technology Development Research Program, claiming that the reduction partly, quote, “reflects no new investments in the areas of manufacturing methods due to reprioritization,” unquote.

Dr. LYONS. Again, that was part of a very difficult budget decision. We will have work continuing in advanced manufacturing that will be funded in fiscal year 2012 and will continue in fiscal year 2013, and some of the university programs which we typically support in 3-year blocks, those will be continuing. But you have highlighted some of the very difficult prioritization decisions that I had to make.

Mr. FRELINGHUYSEN. You are supportive of the small modular nuclear reactors. There is a degree of excitement, and you have been identified with your oversight and your enthusiasm for that program.

Dr. LYONS. Absolutely, sir, and certainly I did my best to maintain that as high as I could.

Mr. FRELINGHUYSEN. And so does the budget submission you have given to us diminish the ability of moving ahead with that program? And this is about jobs. There is an incredible amount of excitement about our retaining our competitive edge here.

Dr. LYONS. I share your enthusiasm for the small modular reactors, and you and I certainly discussed that. I think they may be an entirely new paradigm in how we look at nuclear power and are very, very important.

There has been considerable discussion now, I know it is referenced in congressional reports, in OMB language, that we are aiming for a $452 million Federal support for SMRs over 5 years. Yes, I am concerned when the first 2 years are $67- and $65 million.

Mr. FRELINGHUYSEN. Mr. Pastor.

Mr. PASTOR. One of the issues that you started with, Dr. Lyons, is the Hub, and I am trying to recall. Initial funding was what, about 3 years ago?

Dr. LYONS. The hub has been in operation for about a year and a half, actually, since it was awarded.

Mr. PASTOR. Well, but I think the initial funding was about 3 years ago, wasn't it?

Dr. LYONS. Initially, yes.

Mr. PASTOR. And it took about a year and a half to get it going.

Dr. LYONS. It took about a year to get it going.

Mr. PASTOR. A year to get it going. And what is the status of it right now?

Dr. LYONS. I would be extremely complimentary of the progress of the Hub. It is, as you know, based at Oak Ridge, but it involves a number of other institutions that are supporting: universities, labs, and industry; TVA; Westinghouse; MIT; Idaho National Lab. There is quite a wide range of entities working with Oak Ridge National Lab. Their focus is on developing a so-called virtual reactor; a very complete simulation, end to end, of an operating reactor, using the best current codes and the most modern, high-performance computing. I think it offers the potential to not only significantly improve safety of operating reactors, but to provide a better mechanism for evaluating certainly off-normal operations, but also any possible upgrades. It should play an important role in looking at some of the questions that will come in with possible license extensions. I see the Hub as being on a very solid track doing excellent work in its short existence.

Mr. PASTOR. You probably have some reasons to be very complimentary. Can you explain some of those reasons? What are some of the benchmarks that they have reached, and why do you feel that it has been slow in coming, at least in my belief. Maybe you can update why you are complimentary and you feel like we are moving ahead.

Dr. LYONS. They took on a very difficult challenge, sir, in terms of really trying to introduce modern computational tools to the existing nuclear power industry. They claim their goal, which they met, was to have the initial release of their so-called VERA code, their virtual reactor code, within the first year, and they met that goal, and they will continue to enhance that code substantially over the years.

I guess one of the reasons why I would be particularly complimentary is the extent to which industry is integrated with the

Hub, and helping to define the problems on which they are focusing. When Secretary Chu visited the Hub, I guess it was 3 weeks ago, the same day that we went to Vogtle, he and I were both impressed that TVA and Westinghouse folks from the industry played a significant role in the presentations and in discussing how the codes being developed could help them improve the operation of existing reactors; things like trying to reduce the already very low probability of failure of a fuel pin. And I could talk to some of the mechanisms that are being explored to try to further reduce or further improve the integrity of fuel pins in modern reactors.

Mr. PASTOR. I believe that—and Senator Bennet was a big proponent of this—in fact, I think that is why this thing got funded. Senator Bennet has been gone at least 2 years, but I think one of the requirements at the time in funding these Hubs was that there would be annual reports.

Dr. LYONS. Oh, there are.

Mr. PASTOR. And have they submitted an annual report, or where are we at on that? You had informal reports, but I think the legislation required more formal reports so we could keep at least abreast of how these Hubs were doing, and how they were achieving their objectives.

One of the reasons that we were funding these Hubs was we thought that this subcommittee was going to get on a yearly basis information of how the different benchmarks—well, what were the benchmarks, and then how they were being met, so then we could determine future funding or what was appropriate for the cycle. And I appreciate informal reports, but I think——

Mr. FRELINGHUYSEN. If the gentleman will yield, we will request formal reports through you, Mr. Lyons.

Dr. LYONS. I would be happy to provide that.

Mr. FRELINGHUYSEN. Would you do that?

Dr. LYONS. Yes, sir.

Mr. FRELINGHUYSEN. And while you are doing that, would you also provide for the record your suggestions on how to spend an additional $50- to $100 million if we were to get more money into the nuclear energy programs for the record?

Dr. LYONS. Yes, sir.

Mr. FRELINGHUYSEN. Mr. Pastor, I am going to go to Mr. Simpson, if there is an opportunity.

Mr. PASTOR. I am finea with that, Mr. Chairman.

Mr. FRELINGHUYSEN. Mr. Simpson.

Mr. SIMPSON. Thank you, Mr. Chairman.

Just out of curiosity, if you submit answers to a request that you tell us how you would spend another $50- to $100 million, does that answer have to go through OMB?

Dr. LYONS. It would represent an administration response, sir, so yes. It would represent the overall administration response.

Mr. SIMPSON. I am disappointed in the budget overall, not necessarily how you allocated the money, but the request, and as you said, it was a very low allocation request that you had to work with OMB. Somehow, I would like to know what NE would do with their priorities; what their priorities are in doing this, not necessarily filtered through OMB. I know that is an impossible task to ask you to do, but we need to know that. If we were able to come up with the additional $50- to $100 million, where would the experts in nuclear energy like to see that money put? And we will have these discussions as we go along, I am sure, in developing this budget.

But as I said, I am somewhat disappointed in the overall budget request, as was mentioned by you and by the chairman. NE is down, what, 30 percent for the reactor concepts, R&D was decreased by 36 percent. Much of that was out of NGNP. If you ignore NGNP, the rest of the reactor concepts funding decreased by 30 percent. There is a 3 percent decrease in SMR licensing support, which bothers me in that, as I have said many times, over the 14 years I have been here, we keep heading down different paths, and I thought we had decided on SMRs as the direction we were going to go. Now I am seeing a decrease in SMR funding. Wouldn't it be better if we had a steady budget for SMRs?

Dr. LYONS. As I indicated, Mr. Simpson, SMRs are a high priority, and within the austere budget with which we worked, we tried to protect it as much as we possibly could.

Mr. SIMPSON. Would that be one area you would put additional money into? I am trying to get back to it. I won't put you on that spot.

Let me ask you another question. Last year we included report language that recommended that you compete 10 percent of your budget between industry, universities and labs. I know you have extensive programs working with industry, universities and labs. Can you tell me how you approached the decision of where to spend your money, and how does this impact your mission?

Dr. LYONS. Mr. Simpson, we try for each of our programs to carefully evaluate which entity, university, lab, or industry, would be the optimum provider. Frankly, I am quite proud of the job we have done, and I think it is quite defensible. I have asked our staff to pull together some numbers. For example, in fiscal year 2011, out of our total of somewhat over $800 million, $170 million total went to industry, and the majority of that was directly competed within industry.

If I look at fiscal year 2012, of course we are continuing our large support for university programs on the order of 20 percent of our budget. We are looking at the SMR licensing program, $67 million, which will be entirely industry. We just recently announced a $10 million competition which was among all three entities for advanced materials and advanced manufacturing.

Just in general, sir, in each case as we look at a project, we try to understand the best provider for that service, and in general we will go directly to that entity and, in some cases, we will compete among two or three of the different entities.

Mr. SIMPSON. Along that line, the Integrated University Program at NE was not in the budget again this year. This is kind of a recurring theme where you don't request it, yet, we put it in. What is the status on that? Do you think this is a valuable program, and was it just the budget numbers that required that you drop that out?

Dr. LYONS. Mr. Simpson, I have testified in strong support of this program many times in the past, especially when I was at the NRC. I think my interest in this program has been well demonstrated. The statement from the administration is that they have confidence that the nuclear industry, as it expands, will create incentives for students to enter nuclear-related programs, and that was the basis for that being zeroed in the administration's request.

Mr. SIMPSON. Last year I supported efforts in Congress to increase funding for industry cost-shared programs to help extend the life of the current fleet of reactors. I think we need to keep the current fleet of reactors going. What are your thoughts on this, and is that a valuable program?

Dr. LYONS. The Light Water Reactor Sustainability Program, I believe, is an extremely valuable program in which we are trying to understand what may be the lifetime limiting components of the existing reactors, as well as understanding what can be done in terms of improvements to safety at the same time that we try to understand any potential lifetime limits.

That is a cost-shared program very closely coordinated with EPRI. In my view, it is an extremely important program and provides important information to certainly the industry, but also the American public as they look towards potential extensions, decisions that will be made eventually by the NRC—well, first by utilities, whether they applied to the NRC, and then by the NRC—as to whether they will enable license extensions beyond the current 60 years that many plants now enjoy.

I believe it is a very important program, and that is another program where, again, in an austere budget, we tried to keep that as high as possible. It did suffer a small decrease.

Mr. SIMPSON. Thank you. I will wait for the next round.

Mr. WOMACK [presiding]. Thank you, Mr. Simpson.

Let's go to Mr. Fattah.

Mr. FATTAH. Thank you very much. I don't want to step on the lead here.

So the first thing is that after 30 years, the country now has begun the process of adding to our nuclear power plant inventory through the great work of the Department and this administration, and I want to commend you for that. I have been a major proponent of the loan guarantee efforts, and I don't know how we could say anything other than that after 30 years of rhetoric, we now have gotten to the point where we are actually proceeding again. Because as you point out, over 70 percent of the carbon-free energy produced is produced through nuclear. And so I am very pleased with that.

I was at the Department of Energy Innovation Summit last week with some 2,500 very excited people, because a lot is going on. In fact, I think in today's paper there is a major new development out, a company out of Newark, funded by the Department, that has come up with a battery that can operate for a very long time. So there is a lot to talk about.

I want to talk about the budget because there has been from the majority indications that they want to invest more money, and I am for that. That is why I think we ought to be doing it as a country, but the budget as submitted from the administration, as I understand it, is limited by the agreement that was embodied in the debt limit increase bill. There was an agreement about the level of the budget. And in today's Roll Call, there is a headline that says that the majority actually wants to go from that number to a lower number, in terms of moving the GOP budget. So I am trying to figure out how we invest more if, on the other hand, we are saying that the budget has got to be less and less.

Moreover I saw that the European Energy Alliance is now, because of some of the work of the Department of Energy, getting a little concerned, and they want to invest in some of these alternative energy technologies, and try to compete with us. They have set a goal of 2030 to try to compete on a range of these issues that the Department has been at the forefront.

I am a big supporter of your work, and I see that you have appropriately budgeted for small modular units, and I think that we need to continue to explore in that area what we can do. But we can't spend money unless the Congress appropriates the money. If the Congress in the debt limit reduction bill set a limit, and the administration submitted a budget within the construct of that, and at the same time the Congress is now saying we want to go lower than that limit, it is hard to imagine how we can do that and still at the same time argue that we need to be investing more.

Now, I happen to be of the belief that we should make significant investments in renewables. The largest wind farm is in Honduras, I think it should be here in the United States. It doesn't make sense to me. I also think there is work to be done in geothermal, but clearly one of the major areas for us to work on is in the nuclear energy. And I think that we all, as a committee, are in agreement that we have to do something about the spent fuel.

In the area of nuclear safety, I know the NRC has been looking at this question of dry cask versus cooling pools. It may not be the technical term, but it seems to me that, at least awaiting whatever the eventual decisions are related to Yucca Mountain, that maybe we need to be moving to at least think about a requirement on dry cask.

Thank you for your testimony. I would be very interested in you talking to us about where we can make some disruptive investments in nuclear beyond what is on the table now; What you think we ought to be considering as we think about the world that we are going to be competing in. I mean, the AP1000 is great, and so is the small modular. But are there things beyond these technologies that the committee ought to be thinking about long term?

Mr. WOMACK. Mr. Fattah, you have been very successful in taking all of your 5 minutes with that question. But——

Mr. FATTAH. I have had some practice at this.

Mr. WOMACK. Since I gave my colleague to my left an extra minute-and-a-half or so, I will give you the same.

Dr. LYONS. Well, thank you for your comments, sir. Some of the areas that I have mentioned in my testimony or in some of the previous responses would certainly show areas where I think there is significant opportunity for significant advances. You have mentioned the SMRs. I could not agree with you more.

I mentioned that one of the areas that I also focused on in the fiscal year 2013 budget is the program on enhanced accident tolerance for fuels for the existing fleet of reactors. That will be quite a challenge, and it remains to be seen exactly how much can be accomplished.

But there are some very, very good ideas within all three communities, laboratory, university, and industry, that could, over a period of time, lead to still further enhancements in accident tolerance fuels. And I mentioned that we are continuing very important work, generic, non-site-specific work, in use field disposition. Those are all areas that are important. I could certainly list more.

Mr. FATTAH. No, if you could just comment on the dry cask versus the spent.

Dr. LYONS. Well, let me only note there—a lot of that responsibility falls with the NRC, but one of the areas that we are trying to assist the country and the NRC is in a research program to better understand what potential degradation mechanisms might limit the long-term use of dry casks. This is of interest to us. It is of interest to the NRC. We have created a university-led consortium led by Texas A&M with a number of other universities that have a specific charter in this area and will be investing more research to try to better understand what, if anything, limits the long-term use of dry casks.

Mr. FATTAH. Thank you very much.

Thank you, Mr. Chairman.

Mr. WOMACK. Chairman Jaczko, again, thank you to both gentlemen for your service to our Nation in this area.

Mr. Chairman, on February 9th, the Commission voted to approve construction of the Vogtle reactor. You voted against approval of the license, saying that you couldn't support the license without a binding agreement on the licensee and its partners. Do you currently have such binding agreements with other nuclear facilities across the country?

Mr. JACZKO. I am sorry, binding agreements to——

Mr. WOMACK. Binding agreements that would require the operation of those reactors with the safety enhancements recommended by the NRC after Fukushima.

Mr. JACZKO. Well, the Commission is in the process of determining what specific commitments we would have applied to any reactors in this country.

Mr. WOMACK. So the NRC has the authority to impose such binding agreements on existing reactors?

Mr. JACZKO. Yes, we do.

Mr. WOMACK. Okay. Then here is where I see somewhat of a conflict. You would seem to imply that this new reactor is perhaps not safe enough to operate. Does it also mean that you think the current fleet of reactors should be shut down until the NRC's recommendations following Fukushima are implemented?

Mr. JACZKO. I would say that the license that was in front of us was for a new reactor at the Vogtle site. At the same time we were dealing with that, the Commission was very near to making some decisions about the initial recommendations for complying with the lessons learned from the Japan event.

I think a new licensee is very different from an old, or an existing licensee, in terms of our expectations. In fact, the Commission has a long-standing policy statement that for the new generation of reactors—it is called our Advanced Reactor Policy Statement—we have expectations that the new reactors would effectively be inherently safer, look for inherently safer approaches to dealing with different types of phenomenon. It is partially one of the reasons for the interest in passive reactor technology, which the AP1000 embodies.

So I think the AP1000, in my view, to provide some degree of certainty about how these issues will be dealt with going forward, needed a license condition essentially to commit them to whatever comes out of our review of the Fukushima events.

I would say it is going to be very difficult for us in the next probably year or so as the new reactor licensing work continues, and at the same time, we have more and more information coming out about—about what we do on Fukushima. It is going to be very difficult if at each step with each reactor we are having to come up with some kind of special—special approach and special way to deal with it. In fact, right now there is a potential for having a significant delay in determinations about one reactor license because now there is some interest on the part of the staff to actually require them to address some Fukushima issues before we move forward with the license.

So I don't think right now we have a consistent way to deal with it. I think the approach that I laid out would have actually provided a very consistent approach for dealing with new reactors. It would have given a clear commitment with the understanding in that before they operated, they would be in compliance with the Fukushima lessons learned, but would have done it in a generic way that would allow us to continue with the Fukushima work and continue with the licensing work. I am a little bit worried that as we go forward, that is going to be a little more complicated without that kind of a condition.

Mr. WOMACK. All right. So let me ask that question again in a little plainer English. Was it your opinion that the operation of the existing fleet of nuclear reactors in the country should have been shut down pending recommendations post-Fukushima?

Mr. JACZKO. Right. We did not have sufficient information that would suggest that reactors should be shut down. I think the task force that we established made that recommendation. None of the issues that we saw were of imminent safety concern. They do continue to be low-probability events. So I would say there was not sufficient information that would warrant taking any action like shutting down any reactors.

Mr. WOMACK. What was your opinion, your personal opinion?

Mr. JACZKO. That was my personal opinion. I mean, it was the opinion of the Commission, but it is one that I share.

Mr. WOMACK. How long would you have waited before approving Vogtle?

Mr. JACZKO. I am sorry, I am not sure I understand the question.

Mr. WOMACK. Well, if there is any kind of delay at all in Vogtle, given the fact that there was construction, permanent jobs that would have been deferred, things putting completion at risk, ceding the nuclear industry to overseas companies that are manufacturing this sort of thing, would you have had any delay in Vogtle?

Mr. JACZKO. Well, no. Actually what I was proposing was a license condition so that we didn't have to have any delay. It was actually to prevent any delay, and to prevent, quite frankly, I think, any questions about how Vogtle will actually deal with Fukushima events.

I continue to believe that it was actually the commonsense way to do this. You know, I think if we had information that, you know, suggested that, you know, air bags would be a good thing to have on cars, you know, at the time that people were talking about that, we would expect new cars that are being built on the assembly line to start putting air bags in those cars. We wouldn't necessarily, you know, go forward blindly, and say, well, we will put those in later. That doesn't mean that we would take all of the cars that are on the road off the road because they don't have air bags.

So I think it is much the same analogy, and, as I said, it is very consistent with the Commission's own policy expectations that newer reactors will be looking for enhanced safety features, and, in fact, at least on paper, the new reactor designs do demonstrate that their risk levels for the kinds of things we measure are generally lower than what we see with the current fleet. So I think that has always been the Commission's expectations that we want to see designs that are inherently more safe.

Mr. WOMACK. Okay. And finally, just a general comment, I have got a couple of nuclear plants in my district, and from time to time the subject comes up, particularly in the post-Fukushima era. The question is are our nuclear reactors safe? And I have, somewhat in a joking way, said—ours sits on Lake Dardanelle on the Arkansas River, and realizing the gravity of the tsunami with Fukushima, I have said to people, I am less concerned about a tsunami on Lake Dardanelle as some aggravating circumstance on a nuclear problem there. But generally, if you were me, what do you say to your constituency?

Mr. JACZKO. Yeah, I mean, I indicate to people that we have a very robust oversight program. Right now the majority of operating—well, I would say all of the operating reactors in this country are deemed to be safe. We have one plant that is in a more degraded condition, I would say, and as a result, we have put in place a regulatory practice that we haven't used in a long time, something we call Manual Chapter 0350. I know we don't often speak well in English, but that says that we have some current concerns about that plant restarting. It is currently a plant that is shut down, so that plant we do have some concerns with it operating until it makes a number of improvements and enhancement.

But otherwise, for the other reactors that are out there, they certainly are safe to operate, and they may have some degree of issues and things that we need to address, and we are working to address those with those plants. But with the exception of that one, I would say yeah.

Mr. WOMACK. Thank you.

Mr. Olver.

Mr. OLVER. Thank you, Mr. Chairman.

Dr. Lyons, I think you are quite correct that this is an austere budget. I think that, under the circumstances, you have probably done as well as you could have done.

I have a number of questions. I hope that they will be possible to answer them, if I phrase them correctly. Shortly, you know, because we have very short periods of time to ask our questions.

The Vogtle plants, the two units that have been approved, what is their rated capacity?

Dr. LYONS. About 1,100 watts each—I am sorry, 1,100 megawatts each.

Mr. OLVER. Eleven hundred megawatts each.

Mr. JACZKO. That would be expensive.

Dr. LYONS. Greg may know the precise number.

Mr. OLVER. Is that the basic upper limit of what we are doing, the 100 or so—do we have any that are larger than that? Do we have anything of nuclear power that is as large as 1,500 megawatts, or is that 1,100 roughly the largest?

Dr. LYONS. The operating plants in this country, I am not positive, sir. I think there are a couple that are somewhat larger. Certainly, in new plant designs, they go substantially above 1,100, but they are not passively safe plants.

Mr. OLVER. Okay. All right. Did you say in your testimony that you are expecting approval for another couple of plants of similar size? Is that in the summer or somewhere later this year?

Dr. LYONS. Of course, that is an NRC issue. There has been at least discussion that they are moving ahead on the Summer plant, but I don't know the exact schedule.

Mr. OLVER. So you think that there are a couple that might come to licensure later in the year of a similar size?

Dr. LYONS. Well, that is my understanding, but that would be an NRC decision.

Mr. OLVER. Okay. Yeah, well, whatever decision they will make, I don't wish to enter into their procedures there.

What is the rated size of the Westinghouse AP1000?

Dr. LYONS. I am sorry, the AP1000——

Mr. OLVER. The Westinghouse AP1000, what is the rated power of the——

Dr. LYONS. It is right around 1,100 sir, also.

Mr. OLVER. It is also——

Dr. LYONS. I thought that is the question you asked before. The AP1000 is about 1,100.

Mr. OLVER. Well, is it an AP1000 that is going to be used in the Vogtle plants?

Dr. LYONS. Yes, sir.

Mr. OLVER. Oh, it is. Has it been used before, or is this the first time—that design has been approved?

Dr. LYONS. It is not operating anywhere in the world today; however, there are in China——

Mr. OLVER. It is that design that is going to be used.

Dr. LYONS. Yes, sir, four in this country, four in China that are at least 2 years ahead in construction that should be operating in 2014 in China.

Mr. OLVER. Okay. I was wondering whether this was sort of a generic design that was variable so that you could do it at 600 megawatts or 1,100 megawatts or something by a simple—a simple translation.

Dr. LYONS. The original Westinghouse design was the AP600, and it was about 600. That was a passively safe unit.

Mr. OLVER. That was a pure guess. That was straight off the top of the head.

Dr. LYONS. It was a good guess. The AP1000 is currently certified.

Mr. OLVER. So if they wanted to do a 600, would they have to have that separately certified?

Dr. LYONS. Oh, yes.

Mr. OLVER. Okay. So we now have this design that we can use for 1,100 megawatts.

Dr. LYONS. Certainly the focus——

Mr. OLVER. It is a new design. It has been approved, and it is about to go into construction in Georgia.

Dr. LYONS. The key point I would make, sir, is that the AP1000 is a certified design. The AP600 was also certified, I believe, in the 1990s, but never built.

Mr. OLVER. Never built. Okay. It still is certified if they wanted to build it.

Dr. LYONS. Except that there have been additional requirements added since it was certified. If someone wanted to build an AP600, they would certainly have to change that design in order to meet the current guidelines of the NRC. But I am really——

Mr. OLVER. Okay.

Mr. JACZKO. You are doing a good job.

Mr. OLVER. I am asking simple questions that you could almost answer like yes or no, I think. I am trying to get some others in here.

You seem to be the father of the SMR program. What is the range of sizes that you consider to be small SMRs?

Dr. LYONS. We have generally suggested that it be below 300 megawatts, but I think that the most important statement is that it be suitable for factory construction and available to transport essentially assembled to a site. The key point is take advantage of factory, quantity, hopefully high-quality, construction as opposed to job-built on the site.

Mr. OLVER. Could you actually do a 300-megawatt plant in factory and move it in pieces? How would you move it?

Dr. LYONS. The designs that have been proposed, and there is quite a number of proposed designs, I believe the largest one is the Westinghouse. It is slightly over 200 megawatts. The smallest ones are very small.

Mr. OLVER. So we are still in the process of coming up with the actual designs that will fit into this under 300 megawatts.

Dr. LYONS. Yes.

Mr. OLVER. If you had a 300-megawatt plant, what would be roughly the size of the metropolitan area, or labor market area or what, where you would be able to provide the power necessary for its population for residential, commercial, and the industrial, average kind of usages?

Dr. LYONS. If I am recalling the conversions correctly, it would be between 200,000, and 300,000 people at 300 megawatts.

Mr. OLVER. Okay. Okay.

Dr. LYONS. If that is a vital number, I would like to give it to you for the record, but I think that is close.

Mr. OLVER. Well, no, I am looking for relativities. If I calculate that, your two plants in Georgia would take care of almost any 1 of the 50—well, at least those that are roughly a million population and something, but those are not small plants. You are talking about really dispersing.

In your goals, is there a specific number of plants? I have heard numbers like 100 plants to be dispersed in various places. Do you have a goal for how many of these SMRs you might want to see in place in a 10-year period?

Dr. LYONS. I view my goal for the moment as getting it through design certification. I would hope then that there would be enough interest in industry, perhaps within the government, to encourage enough construction that utilities would be interested in ordering enough units that it becomes cost-effective to use the factory fabrication. You can easily imagine that for the first unit or two; it makes no sense to build a factory to build one or two units.

The benefits of the SMRs will come first when they go through design certification, which is up to the NRC; second, when they begin to be deployed; and hopefully in enough quantity that the factory construction benefits can be demonstrated.

Mr. OLVER. Our whole industrial revolution started to grow when we finally figured out how to make universally replaceable parts. And so the concept here is to build factories that are going to build the whole nuclear plant and sort of plop down wherever you want it, and build a lot of them.

I will come back.

Mr. WOMACK. All right. Thank you, Mr. Olver.

The gentleman from Mississippi, Mr. Nunnelee.

Mr. NUNNELEE. Thank you.

Thank you, Mr. Chairman.

Mr. WOMACK. You can use both microphones, if you want to be heard in stereo.

Mr. NUNNELEE. Mr. Chairman, first of all, I want to commend the Commission for bringing to completion the Vogtle application. But I also have interest in my State. I understand there was a recently submitted application for Grand Gulf.

But I am more interested in the process. It is my understanding that in the testimony you gave before the Senate and follow-up press interviews you were quoted as saying that limited staffing at the United States Nuclear Regulatory Commission may delay the agency in renewing licenses for existing nuclear power plants, and another quote says there are resource limitations.

So I guess, to start with, does this 2013 budget request include adequate resources for you to continue to review license renewals as well as new construction?

Mr. JACZKO. Yes, did you say limited or appropriate?

Mr. NUNNELEE. No. Does this allow you the resources to review the license renewals as well as new construction and operating licenses?

Mr. JACZKO. Yes.

Mr. NUNNELEE. You can get the job done?

Mr. JACZKO. Yes.

Mr. NUNNELEE. It is my understanding that your published milestone goal is 22 to 30 months. But it looks to me like recent applications, Vermont, Yankee and Pilgrim, are taking longer than 5 years. So what is the time line?

Mr. JACZKO. In general, the 22 to 37 months—the 22 is for applications that do not have one of our formal hearings for license renewal; and in general, for those sites, we do really meet the 22. Where it has been more difficult is those sites that have a formal hearings attached to them; and that would be in particular the Pilgrim site, Vermont Yankee, Indian Point. We may potentially have some additional ones as well, a site, Diablo Canyon in California. Those are all in the more formal hearing process, and we have not done as well meeting our timelines there. But sometimes that is just the nature of the process. As issues arise, they need to be vetted appropriately through the hearing and get resolved.

So for those outside the hearing, we generally meet the timelines. When they are in the hearing, we are, in some cases, taking a little bit longer. But, in the end, we have to do what we need to do to get the right safety answer.

Mr. NUNNELEE. So the ones where you have to have a hearing, what is the expected timeline?

Mr. JACZKO. Well, you know, again, the expected timeline is about 3 years. So for some of them it is taking longer than that. But, as I said, in the end, the timeline gets established by the issues that are introduced that make it through our kind of acceptability review for the hearing. It depends not on the need to do additional technical analysis. It is just a variety of factors that could go into it.

It is a little bit harder in that case to predict, but we do require the licensing boards that oversee these hearings to report periodically to the Commission. They have milestones. If they don't meet those milestones, they report to us. So the Commission itself can intervene, if necessary, to move a proceeding along.

Mr. NUNNELEE. Now, moving back to previous items of discussion, the SMRs. Just in general, how many applications do you anticipate receiving over the next couple of years, Dr. Lyons?

Dr. LYONS. Well, our focus at the moment is on a licensing demonstration program. We intend to have the funding opportunity announcement issued this month. I can't tell you how many companies will apply for that. We have indicated an interest in funding up to two and taking this in a cost-shared way through design certification. But, of course, until the procurement is out, I can't tell you how many applications there will be. I would not be the least bit surprised if it is greater than five, but that is a guess. I don't know.

Mr. NUNNELEE. Does your budget request include adequate resources to allow you to process those two to as many as five?

Dr. LYONS. It certainly provides adequate resources for us to evaluate the responses to the procurement and to move ahead with the cost-shared program. But, as I indicated earlier, we are looking at a nominally 5-year, $450 million program for up to two units—for up to two designs.

Mr. NUNNELEE. I understand you released draft guidelines in January. When do you expect the final guidelines?

Dr. LYONS. Within this month. The goal is March 26th, sir. The comments were received on February 17th. We are analyzing those comments as we speak.

Mr. NUNNELEE. All right. What is the timeline on the two applications that you expect to receive?

Dr. LYONS. We will allow 60 days for responses; and, after that, we will then take as long as it takes. Hopefully, we can do it in a few months. Our goal is to identify the top one or two candidates and proceed with awards this fiscal year. That is our target.

Mr. NUNNELEE. All right, let me just kind of wrap up my time period. Just give me your general view of these small modular reactors and their role in American energy production.

Dr. LYONS. I think at this time small modular reactors will offer a new way in which utilities can consider the use of nuclear power. The very large units, the megawatt class, requires a large transmission grid and they are very—they are multibillion dollar investments. That is outside the range of at least some fraction of our utilities.

We anticipate that there will be interest in the smaller units from smaller utilities, perhaps utilities that wish to start small and then add modules as their demand increases. As one goes in general smaller on a reactor, you can find very innovative ways of making them very passively safe; and we anticipate that there will be improvements in the passive safety, even above existing designs.

So these will be some of the advantages, sir.

Mr. NUNNELEE. All right. Thank you.

Thank you, Mr. Chairman.

Mr. WOMACK. Mr. Pastor.

Mr. PASTOR. Could you explain to me why there has been such delay? I think it has been at least 2½ years in the works where this subcommittee initially funded the small modular reactors, and I understand maybe this summer you might even do the grant application?

Dr. LYONS. Well, sir, unfortunately, we have been operating under Continuing Resolutions for quite a period of time.

Mr. PASTOR. Okay.

Dr. LYONS. And the small modular reactors were considered new start. We are not allowed to initiate a new start unless there is a special exception made by the Appropriations Committees. That exception was not granted. So we had to wait until the fiscal year 2012 appropriation was passed just prior to Christmas. It was a wonderful Christmas present for me, sir.

Mr. PASTOR. Good. Merry Christmas.

Dr. LYONS. That enabled us to start, and we began in January.

Mr. PASTOR. So then you expect that sometime this summer the request for application will be going out?

Dr. LYONS. I expect sometime this summer that we can announce up to two winning proposals to move ahead into a 5-year program, with a goal of design certification through the NRC. They will not be ready to file instantly with the NRC, but the exact timing when any one of them will file will be dependent on that particular company and where they stand in their design.

Mr. PASTOR. As you look to the design phase, what do you think would be—the ideal time it would take so that we could start the NRC process? You must anticipate a timeline.

Dr. LYONS. Several of the companies have said they will be ready—have stated publicly that they will be ready to file with the

NRC in late 2013. At least that is the date several companies have stated publicly.

Mr. PASTOR. So let me ask the chairman, late 2013, what plans have you made in terms of moving this along, since you have great support from the subcommittee and I guess overall great enthusiasm that this is somewhere we want to go?

Mr. JACZKO. Well, I think we have been well-prepared. We have appreciated the appropriations we have gotten to prepare for these submittals.

We have had a number of meetings with the potential applicants, and we believe right now that there are three—basically, three companies that have expressed interest. I think that may change depending on what happens with Secretary Lyons' program.

We are in good position. In fact, in our 2012 budget submittal we had anticipated receiving applications in fiscal year 2012. That, obviously, is not going to happen. So we are preparing. In part of our submittal in fiscal year 2013 we do have budget resources to review applications or to do pre-application activities, depending on the stage of the applications.

So I think we are in pretty good shape. We are identifying a number of policy issues that may need resolution in order to help facilitate those design reviews. We are working through those policy issues. And so I think right now, if anything, we are waiting on the applicants to be ready. But we are in pretty good shape.

Mr. PASTOR. Going back to the Hub, since the start of the Hub you have done the virtual nuclear reactor and you have gotten input from the industry, how have you accommodated things that have occurred like Japan and probably other nuclear reactors that have leaks or had problems? What do you do in taking those examples—or do you—and making sure that this virtual reactor is progressing forward and the best use for it is being done?

Dr. LYONS. Well, the Hub does have established goals. As we get the reports to you, those will certainly spell out the goals and their progress towards them.

Mr. PASTOR. What do you think the timeline will be for the report?

Dr. LYONS. I believe several reports have already been written, and we will make sure that you get them, sir. I think it can be done within a month, because I believe the reports exist.

Mr. PASTOR. Well, good.

Dr. LYONS. But if you ask how the Hub was used for Fukushima, in general, that was not the focus that we have pushed.

Mr. PASTOR. No, the question is, what happened in Japan, have you been able to take what has happened to that reactor and do data in the Hub to say this is how we could improve it or this is what we need to do as we continue to work on the Hub?

Dr. LYONS. Not through the Hub, sir, for some specific reasons. The reactor design in Japan is a different design substantially than the one being done through the Hub.

However, our program, through an MOU with the NRC, we have agreed that we are working together to utilize the best capabilities within the national laboratory for severe accident modeling to model the accident at Fukushima, first from the standpoint of understanding if our severe accident management codes need improvement, but second from the standpoint of better understanding if there are lessons that in turn apply back to U.S. plants.

And the appropriate division here—because we need to stay out of the regulatory area. We can work to improve the codes and work together with the NRC to ensure that the codes are well modeling Fukushima. But then how those codes might be used for a regulatory decision crosses this boundary, and that is the NRC's job.

Mr. PASTOR. Thank you.

Mr. WOMACK. Thank you, Mr. Pastor.

Mr. Simpson.

Mr. SIMPSON. I am shocked, Secretary Lyons, that you would tell us that operating on a CR has implications for agencies out there. Something I have been trying to tell my colleagues for quite some time.

I am very concerned about the proposed budget cuts to the advanced reactor program and for a number of reasons. One is a practical reason. The other one is, as you recall, last year, the Senate marked up a bill that had significantly cut these programs; and through some hard work of the staff here on this committee and others we convinced the Senate to come along with us. I am concerned that if we start at a number that is suggested in this, it will be much harder to negotiate with the Senate and get a number that is acceptable.

Could you please share with me the value you see in completing the NPNG fuel development program?

Dr. LYONS. There are some very important experiments underway in the NPNG world. The ongoing experiments involve fuel characterization experiments that are actually resident within the advanced test reactor in Idaho as we speak as well as experiments on better understanding the properties of graphite under irradiation, and those are also in the ATR.

Those are certainly important experiments from the standpoint of understanding a type of fuel called TRISO fuel, which is an extremely robust type of fuel that might be of great interest in gas reactors. However, we are also at least wanting to explore the possibility that that type of fuel might have applicability well outside high-temperature, gas-cooled reactors. We want to look at it for other types of high-temperature cooling systems. And we anticipate that that type of fuel will also be at least evaluated for—I mentioned enhanced-accident-tolerant fuels. We anticipate that the TRISO type fuel should be at least evaluated for that type of application. There are several technical reasons why that would be challenging, but it is not impossible, and the TRISO fuel is an extremely robust type of fuel, very, very high melting points.

Mr. SIMPSON. Thank you.

Chairman Jaczko, it may come as a shock and a surprise, I am not going to ask about Yucca Mountain.

The V.C. Summer plant license application has been before the NRC since 2008. Ever going to make a decision? Ever going to bring it up for a vote?

Mr. JACZKO. We are very close to that, yes.

Mr. SIMPSON. It is very, very, very similar to the Vogtle plant design.

Mr. JACZKO. The design itself is, at a generic level, the same design. It is an AP1000 design. There are some site-specific issues that are a little bit different, but it is one that is very close to resolution.

Mr. SIMPSON. Any idea when? I mean, are we waiting for a new commissioner or are we actually going to bring it up for a vote?

Mr. JACZKO. Well, bring up for a vote is probably not an appropriate—that is not really the way we work. But it is very close——

Mr. SIMPSON. I know.

Mr. JACZKO. And, believe me, I would love to change that.

It is very close. Generally, the first public statements, it would be about a week's formal notice, but I think we are very close. Beyond that I wouldn't say, but I don't think—it is certainly not months timeframe.

Mr. SIMPSON. I have one more comment and maybe a question. The only thing the NRC has going for it is credibility. Under your leadership, that credibility has been diminished. What you are doing to try to address that issue? I noticed you mentioned that it is one of the 10 best places to work in the Federal Government, according to some poll or something like that.

Mr. JACZKO. One of the two.

Mr. SIMPSON. In spite of that, the relationship between you and the other commissioners has been damaging to the reputation of the NRC and, therefore, the credibility of the NRC. What are you going to do to try to address that? Because once you have lost that credibility, you are done.

Mr. JACZKO. Well, I think as an agency, certainly we still have very good credibility. You know, I think if there was ever a time in which that credibility was tested, it has been after Fukushima; and I think there have been a number of difficult questions that we as an agency have had to answer.

Mr. Chairman, Congressman Womack, as you asked—how do we answer the question of people who say our plant is still safe? I think we have been able to answer those questions, and answer them to the satisfaction of most people. We are not always going to make everyone happy.

Mr. SIMPSON. But the only way that the public is going to believe that is if you maintain credibility. If they believe it is just a political organization and becoming more politicized all the time, then you damage that credibility. And it doesn't matter what you say, whether they are safe or not, because nobody is going to believe you.

When I hear reports that you believe you are more concerned about safety than the other commissioners are concerned about safety when you vote differently on the Vogtle plant—and I am not criticizing that vote. I assume you voted the way you felt. But when we start to challenge commissioners about who is the most safety conscious, I think that damages the NRC.

Mr. JACZKO. Well, I certainly appreciate those comments; and I will keep them in mind as I go forward.

And, you know, I certainly have been very candid about my views on a lot of different issues. I never shied away from it—I think that is an important part of credibility.

I actually think, to be honest, that the fact that there were disagreements over Vogtle is a positive sign for the agency, because it demonstrates to people in the public that we do talk about these issues. We do think about them. We do sometimes disagree and, in the end, we move forward.

And I think that is the hallmark of what we are as an organization. We don't shy away from disagreements. We do not shy away from disputes. We don't shy away from making those public. And that, I think, is what people need to see in a safety regulator, and I think that is what they see at the NRC.

I appreciate your comments, and they are things I will definitely keep in mind.

Mr. SIMPSON. Thank you.

Mr. WOMACK. Thank you, Mr. Simpson.

Mr. Olver.

Mr. OLVER. Thank you, Mr. Chairman.

I want to go back to the SMRs. I am wondering here a little bit about whether the two of you are allowed to talk to each other on these issues because of the regulatory difference. Is there a heart-to-brain barrier?

Dr. LYONS. No, in fact, sir, there are many joint programs that are worked very successfully between the two organizations. And, frankly, since I spent 5 years sitting there——

Mr. OLVER. You are going to come back with a long answer. I just wanted to make that comment.

You implied that you have a law which says the most demonstrations for designs under this RFP, you are still in the comment stage about it, I think—that the most you can do is two, up to two. You can do one or two, apparently. Is that correct? You are limited to doing two?

Dr. LYONS. That is what we said in our budget submittal, sir.

Mr. OLVER. Isn't this off of last year's appropriation? The demonstration? The RFP?

Dr. LYONS. The RFP will use fiscal year 2012 moneys, of which there is $67 million in fiscal year 2012.

Mr. OLVER. Right. Okay. So you already have the money.

Dr. LYONS. Yes, sir.

Mr. OLVER. Okay. So does that limit you to no more than two? That $67 million?

Dr. LYONS. In our budget discussions, in our so-called CJs, congressional justifications that come over here on the budget, we have used the phrase "up to two," and we have also used the phrase I think it is $452 million over 5 years.

Mr. OLVER. That goes far beyond your putting out an RFP to get some designs so that you can go to a demonstration on SMRs.

My next question was, you had mentioned that someone had come in earlier with a sort of a proposed design in the 200 megawatt range. That you think that 300 is the upper limit. Do you have any limit on the wattage that they must fall within to be eligible under the proposed RFP?

Dr. LYONS. 300 megawatts, sir.

Mr. OLVER. Upper limit, but is there a lower limit?

Dr. LYONS. No, sir. But there are many other factors such as a business plan, such as showing how this will benefit U.S. manufacturing, the U.S. taxpayer. There are many criteria as part of this procurement.

Mr. OLVER. But there has to be an economy of scale sort of issue that, if you go even lower, somewhere along there it becomes ever more costly at the capital level to come up with a plan—for the amount of power that it is going to be able to provide.

Dr. LYONS. Absolutely. And that is why their business plan is a key factor in determining who will eventually rise to the top of this competition.

Mr. OLVER. So they will come up with it, and you will judge whether their business plan has any capacity to be functional or not in the process?

Dr. LYONS. Yes, sir.

Mr. OLVER. But you would want them to be somewhere—you don't want proposals for 5, 10, 20 megawatts, do you?

Dr. LYONS. Well, if it is a simple module that can be replicated in large quantities, it is not ruled out, sir. The key will be how the business plan shows that it benefits the U.S. taxpayer and how executable the business plan is. As you point out, as you go down in power levels, it will become increasingly challenging to come up with that business plan.

Mr. OLVER. But you are still are trying to stay within—when you are talking about manufacturing in a single manufacturing facility—we are talking about the reactor itself. There is going to be lots of construction at the site of other sorts, but if you are talking about the reactor and limiting size on that, that is likely to be—somewhere in the 300-megawatt, you think that is probably the limit of single factory replication?

Dr. LYONS. Of the designs that have been discussed publicly, the ones that I am thinking of at the moment, the smallest is 25 megawatts and the largest is, I believe, the Westinghouse, and I think it is around 210 or 220 megawatts. There is a 45. There is a 110. There is a range.

Mr. OLVER. Well, if you get 10 of such designs, do you have the money—if this is a demonstration and you had what you think are good business plans, wouldn't you want to have several demonstrations? You get maybe only one chance for this. Or do you have some money in for continuing demonstration in fiscal 2013.

Dr. LYONS. Our program is a licensing demonstration to take it through design certification. It does not construct the unit.

Mr. OLVER. Okay. Such complications.

I get the impression that you are trying to demystify the nuclear power processes in getting them spread out, rather than in huge places where you have two, three, four units that end up obviously being targets for public controversy.

Dr. LYONS. I would say more that we are trying to offer additional options for utilities that could allow them to use nuclear power if that fits their overall interests.

Of overriding importance to me is that I think this is an opportunity to restart a U.S. industry, and to me, one of the most exciting aspects of the SMRs is that they can be truly built in America, completely built in America and literally trucked or by rail to the site. And, hopefully, that will be sites not only in the U.S. Hopefully, there can be an export market. But first in the U.S. would be our hope. But I see it as a new way of enabling leadership in a key area of nuclear power and enabling a new U.S. industry.

Mr. OLVER. Fine. Thank you.

Mr. FRELINGHUYSEN [presiding]. Thank you, Mr. Olver.

Mr. Womack, I want to thank you for chairing the committee in my absence. I apologize to the witnesses as well for my absence.

Mr. WOMACK. My honor, Mr. Chairman. I feel like the pitcher that just got the hook, so I am happy with going back to the bullpen.

I want to go back to TRISO for just a moment. My colleague from Idaho mentioned the next generation nuclear plant program, and you started talking about TRISO. I am a little fascinated with that fuel. So when could this TRISO be deployed in existing reactors? And what kind of barriers are there to that?

Dr. LYONS. This is not anytime soon. If one were to use TRISO type fuel, at least our current thinking is you probably would have to go to higher enrichments that would lead to some significant regulatory questions. This fuel has not been—to the best of my knowledge has not been—that is not quite true. It has been in test reactors. It is certainly is not close to being in a commercial reactor.

I don't want to overstate the potential for TRISO, sir. I was only emphasizing that as an exceedingly robust type of fuel it is and that it is at least one of the types of designs that we should evaluate for increased accident-tolerant fuels.

Mr. WOMACK. Does the budget fully support the TRISO fuel activities?

Dr. LYONS. That is certainly an area where—the whole NGNP program was an area which was part of our prioritization. Difficult decisions. As Mr. Simpson noted, that is down to about $20 million in fiscal year 2013.

Mr. WOMACK. So I take that as a no.

The Light Water Reactor Sustainability Program has focused on significant steps in accident tolerant fuel and other post-Fukushima work. The advanced fuel program similarly plays a key role in the Department's Accident Tolerant Fuels Initiative. Can you describe the safety focused activities in these two programs? Any shifts in those activities in this year's request?

Dr. LYONS. In the Light Water Reactor Sustainability Program there has been some effort in accident tolerant fuels. That is done jointly with our fuel cycle R&D program.

In addition, the modeling and simulation that I mentioned in which we are testing our severe accident management codes in cooperation with the NRC, that is also being done through the Light Water Reactor Sustainability Program. Those would be a couple of examples.

Mr. WOMACK. So, given the focus on fuel safety, then why does the budget request cut both of the programs?

Dr. LYONS. I can only——

Mr. WOMACK. Advanced fuels by nearly a third.

Dr. LYONS. I can only repeat again that we are dealing with an austere budget, and we made difficult prioritization decisions.

Mr. WOMACK. Are there any other major activities that you can focus on here in the limited time that I have left that focus on making these reactors safer?

Dr. LYONS. There are a number of different areas that we have explored post-Fukushima in addition to the accident tolerant fuels. There has been a program, also joint, with the NRC and with EPRI to look at better seismic models. There has been increased emphasis within the university community on safety related issues. Those would at least be some of the examples that we are pursuing in this area.

Mr. WOMACK. Okay. Mr. Chairman, I am going to yield back.

Mr. FRELINGHUYSEN. Thank you.

Mr. Pastor.

Mr. PASTOR. When the administration decided to shut down Yucca Mountain, I believe that this subcommittee, knowing that there was great expertise and personnel and manpower, knowledge, that we appropriated money so that hopefully many of the people involved in that licensing process were kept. And I don't know, but there was going to be movement from the civilian radioactive waste management component to various offices in DOE just to maintain and keep some of that knowledge.

Now, it is my understanding that sometime this summer, the D.C. District Court is going to make a decision on the appropriateness of shutting down Yucca Mountain. If the court decides that the administration did not have that authority and the licensing application needs to continue, Dr. Lyons, how soon would you start the process for the licensing of Yucca Mountain?

Dr. LYONS. First, let me note that that court decision doesn't involve the Department of Energy. That involves the NRC. If the NRC were to restart, then presumably there would be requests for information coming into the Department of Energy and we would——

Mr. PASTOR. Okay. I will get back to you.

And let me ask you. I know in the past we have had carryover funds. If the court decides to say that the licensing procedure should continue because of lack of authority to do it, how soon are you going to start the licensing procedure?

Mr. JACZKO. Well, I am very reluctant to speculate on any decision the court might make. Of course, whatever decision the court issues we would evaluate and take whatever action we could. We have not received any appropriations in the last few years for Yucca Mountain.

Mr. PASTOR. But you had some carryover money.

Mr. JACZKO. We had some carryover money. So, in any case, we would take whatever decision, and we would evaluate it. It is hard for me to speculate right now on what that would mean. Sometimes this can become a question of skill set and expertise rather than financial resources. So it is just hard to speculate right now.

And I think, as I recall, I believe oral arguments are to take place I believe in May on that court decision. So it is unclear, of course, when a court might issue a decision. It may not be until the fall, or beyond that. So, it is just hard to speculate right now on where we would be at the time that a decision would come down.

Mr. PASTOR. If the circuit court says that you did have the authority to shut down Yucca Mountain—we have been collecting fees to fund the Nuclear Waste Fund. I think we have about $28 billion in that fund, somewhere around that, more or less. If the court says that the administration did have the authority to shut down Yucca Mountain, how soon will you notify the people who are putting in this fund that the collection of these fees will no longer be needed?

Mr. JACZKO. On that one, I would pass back to——

Mr. PASTOR. Good, they do talk to each other.

Mr. JACZKO. We don't have the fees. They have the fees.

Dr. LYONS. The Secretary of Energy is responsible for setting that fee and for reevaluating it on an annual basis.

In the past, we have been asked frequently if the fee should continue in light of the current situation regarding Yucca. The very strong answer has been yes, because the administration and the Department continues its responsibility for used fuel management. That doesn't go away. And, for that reason, the view has been that, yes, the fees should continue.

Mr. PASTOR. But I thought that the initial fees to be collected, and were collected, were for Yucca Mountain.

Dr. LYONS. No, sir. They are for management of used fuel.

Mr. PASTOR. Would you have some consideration to say that possibly now, because Yucca Mountain is shuttered and you have the authority to do it, that you would not collect the fee anymore? Is that a possibility?

Dr. LYONS. Do we have the authority?

Mr. PASTOR. No, would that be a possibility that you would say, since—because the fees are——

Dr. LYONS. That question has been evaluated many times within the Department over the last few years and the continued statement, which I have made testifying here and the Secretary has made many places, is that it remains necessary to continue to collect the fee because the Department maintains the responsibility for the management of used fuel.

Mr. PASTOR. How do you think the Department will eventually decide? I know that you have taken the blue ribbon recommendations. You now have a committee internally. I don't know how transparent it is going to be. So when do you propose or when do you think you are going to have some recommendations? How you are going to accomplish this responsibility?

Dr. LYONS. In the fiscal year 2012 appropriations language we were asked to develop a strategy, and the request was that we provide it to Congress 6 months after the delivery of the report. So that at least our target, based on that, would be a July 26th discussion of a strategy.

Mr. PASTOR. Of this year?

Dr. LYONS. Of this year. Yes, sir.

Mr. SIMPSON. Will the gentleman yield?

Mr. PASTOR. Sure.

Mr. SIMPSON. Let me ask you, if the fees are for the Department taking management of used fuel, and part of that is finding a permanent repository, et cetera, et cetera, all of that kind of stuff, and we are currently paying utilities to store fuel on site; right?

Dr. LYONS. We are indirectly, sir. We are not paying utilities directly. Utilities file suit against the Department of Energy. I should say if they win—they certainly have been winning lately—those funds then come from the judgment fund.

Mr. SIMPSON. From the judgment fund, not the Nuclear Waste Fund?

Dr. LYONS. Yes, sir.

Mr. SIMPSON. So we have collected money for the Department to take control of spent nuclear fuel, and we are effectively doing that by not doing it and having the utilities sue us so that we pay it out of the judgment fund.

And I noticed that—I saw an article the other day about the amount of money that is being paid out of the judgment fund for various things. The Department of Energy was far and away the greatest amount being paid out of the judgment fund.

But are we avoiding our responsibilities by not paying it out of the waste fund rather than out of the judgment fund? We are just shifting responsibility. Because we were supposed to take control of this stuff in '98?

Dr. LYONS. That was the date in the Nuclear Waste Policy Act, which also very narrowly prescribes the utilization of the Nuclear Waste Fund. And at least the judgment has been that—the judgments on these various suits—should be paid from the judgment fund. I am sorry. So, effectively, I think Congress would have to change language in the Nuclear Waste Policy Act in order to address that question.

Mr. SIMPSON. And then we could have them take it out of the NRC because they failed to do the licensing.

I am just kidding.

Mr. JACZKO. As long as we receive appropriate appropriations for that.

Dr. LYONS. This question has certainly been evaluated in the courts, and the decision was that we could not use the Nuclear Waste Fund.

Mr. FRELINGHUYSEN. You can reclaim your time, Mr. Pastor.

Thank you, Mr. Simpson.

Mr. PASTOR. What is the probability that August 1st of this year you will have the report that you are required to give to the Congress?

Dr. LYONS. Again, a congressional request was for July 26th. That is our target, and we are working towards that date.

Mr. PASTOR. What is the probability that you are going to have it?

Dr. LYONS. Sir, this will be a decision involving the Department and many agencies in the administration. I can't give you a probability, sir. It is our target. That is the best I can do. And there are certainly strong activities going on throughout the administration working towards that date.

Mr. PASTOR. I would hope that you go back to the Department and say that it would be very embarrassing if next year at this time we were asking the Department for the report that they committed to do August of 2012. And so I would appreciate that you encourage them to do it as quickly—well, to do it by the date, number one. And if they can't get it done, to please do it before March, 2013.

I yield back, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Pastor.

Mr. Nunnelee, thanks for your patience.

Mr. NUNNELEE. Thank you, Mr. Chairman.

Chairman Jaczko, at the end of last year, all four of your fellow commissioners contacted the chief of staff of the President of the United States and said they believe your actions and behavior have caused serious damage to the institution and created a chilled work environment and that has compromised the Nuclear Regulatory's mission to protect the health and safety of the American people.

When your job performance rises to the level that somebody contacts the President of the United States, that is pretty serious. I want to know what has changed since New Years in the internal workings of your organization to address this concern?

Mr. JACZKO. Well, I have had a number of meetings with my colleagues and talked to them about these concerns. I have had a number of meetings with the staff to talk to them about anything that I may have done that somebody viewed as inappropriate or as creating a challenge. And so I have worked to address any misperceptions or miscommunications that have been made.

I would note, though, that I think if you look at the performance of the agency, the performance of the agency continues to be at a very high level. It has been at a very high level since the time that I became chairman, and I think it continues to be at a very high level.

And so I think there will always be disagreements among commissioners, and I think certainly I have heard some things from my colleagues areas that they had of concern, and so I have worked to improve communication in a way that addresses those.

But I think, bottom line, the agency continues to be focused on its mission. The surveys we have conducted demonstrate that. As I talk to people in the hallways the sense I get from people is they are committed and dedicated to doing what we need to do for the American people.

Mr. NUNNELEE. So is the work environment any different in March of 2012 than it was in December, 2011, when these four commissioners contacted the President of the United States?

Mr. JACZKO. Again, you know, that is probably a better question to ask the others. Every day I come to work I work to do the job with integrity and diligence, and that has not changed. I did that in December. I did that in November. I have done that throughout the time I have been chairman. So I haven't changed in that regard in my continued focus on doing my job and doing it as well as I can and every day to try to do it a little bit better than I did the day before.

Mr. NUNNELEE. Just this week, apparently, there has been a public disagreement as to whether we have made progress implementing the post-Fukushima reforms. Your comments in the Wall Street Journal says we are behind. Another commissioner says, no, we are ahead of schedule. When I get mixed messages like that, how am I, as a policymaker, supposed to address a very important issue of safety in nuclear power plants in the United States?

Mr. JACZKO. Well, Congressman, I can't guarantee you unanimity on the Commission; and I think that is a false expectation. I think if anything I worry about, I worry about statements or questions like this that could be interpreted to mean that it is not okay for the commissioners to disagree; and I think that is a very important tenet of our Commission, that we are able to address publicly disagreements, different views. That is the nature and the reason that we have a Commission. So I do not consider that in any way, shape, or form to be a bad thing.

What we do is we try and formulate positions. When we have firm Commission positions, I articulate those as the chief spokesperson for the agency. But in the process of developing those, there are disagreements. And I can't make everyone agree with me, nor do I want to. And I can't keep them from talking to the press, nor do I want to. So I don't consider that to be a bad thing at all, and I don't consider that to be reflective of a bad environment. I consider that to be reflective of a very good, positive environment.

Mr. NUNNELEE. I understand. I am a Member of the House of Representatives. I understand disagreement goes with the territory.

I do think that bullying and intimidation, withholding information from Commission members is a bad thing. And I want to make sure that the Commission members and the staff people have the resources they need and are working in the environment they need to work in to make proper decisions.

Mr. JACZKO. Well, I would just say, Congressman, I would think all of my colleagues, under oath, in Congress in a hearing back in December were asked the question of whether they had ever not had information they needed to make the decisions; and each one of them answered that they had had the information they needed.

So I have never intended to withhold information from any member of the Commission. And as part of being chairman my job involves helping to manage the agency; and that invariably affects decisions of timing, of work flow, and sometimes that can affect timing of information and prioritization. That is part of the job.

So I think part of this disagreement stems from just a lack of perhaps alignment among all of us on the Commission about what that means.

Mr. NUNNELEE. All right. Thank you.

Mr. FRELINGHUYSEN. Thank you.

Apropos of Mr. Nunnelee's comments, you say that the agency is not on pace to meet its own timetable. There are four commissioners that say that we are or have some disagreement with you. That is the basic question. Are we or are we not?

Mr. JACZKO. Well, the Commission, in adopting a number of the recommendations for the task force, set a target of completion of all activities for implementation within 5 years. Now, these are factual statements. The staff proposed to the Commission a number—kind of the first set of actions that we would take as an agency. Those actions recommend or suggest that the timelines for completion would be well beyond 5 years. So, given that factual information, without a change, we are not going to meet the 5-year target that the Commission established. Now, some commissioners may not feel that—some may feel that is okay——

Mr. FRELINGHUYSEN. What about the issue of evaluating recommendations on a case-by-case basis? You take a contrary position. Or what is your position?

Mr. JACZKO. I am sorry? Evaluating——

Mr. FRELINGHUYSEN. The recommendations for upgrades.

Mr. JACZKO. Uh-huh.

Mr. FRELINGHUYSEN. Are you taking a contrary position to your other commissioners?

Mr. JACZKO. Well, the commissioners have, by and large, all agreed—well, the Commission, I should say, has adopted all the recommendations of the task force that we established, including a number of additional recommendations from one of our advisory committees. And there is only one recommendation from the task force that the Commission has deferred. So, in that case, I would probably disagree with my colleagues, because it was a recommendation that I supported moving forward on.

So I am not sure—so, at the general level, the Commission is supportive of the recommendations of the task force. And that is a position that personally I agree with.

Mr. FRELINGHUYSEN. Do you support the whole notion of requiring a cost-benefit analysis of some of the changes recommended?

Mr. JACZKO. I do not.

Mr. FRELINGHUYSEN. Tell us why.

Mr. JACZKO. I believe, consistent with what the staff of the agency recommended, that these changes are necessary to prevent a Fukushima-type accident.

Mr. FRELINGHUYSEN. It is interesting—and we want to be respectful of you—that some of the people you serve with have pretty substantial credentials. They have been involved in this area and have a degree of expertise and knowledge. How there could be this—respectful of your position and your right to disagree, how could there be this enormous gap here? What is it?

Mr. JACZKO. I can't explain it. As I said, the staff of the agency has recommended that we not consider these actions under cost-benefit analysis. The staff collectively has tremendous expertise, too, so I am comfortable with that staff recommendation, and it is something that I have supported. But it is a judgment call, and each commissioner can bring to it different——

Mr. FRELINGHUYSEN. The staff has come to somewhat of a unanimous view that supports your position? Or is there some divergence of opinion within? Maybe people—I wouldn't intimate that anybody would have to do your bidding, but, in reality, you and your fellow commissioners have this major responsibility. We would hope there would be some interchange.

Mr. JACZKO. Absolutely. And the task force that we established recommended that these changes not be made with consideration of the cost. On subsequent reviews by the staff of the agency, the final judgment of the staff—and, again, I can't say that I polled every single member of the staff—the judgment of the staff was that they should not be subject to a cost-benefit analysis.

So that is where the staff came out. I didn't influence that or tell them how it had to come out. That is what they came to as their judgment, as did the task force.

Mr. FRELINGHUYSEN. The industry is doing some things their own. What is your view of the efforts and investments they are making on their own behalf?

Mr. JACZKO. I certainly encourage them——

Mr. FRELINGHUYSEN. And consumers and public good.

Mr. JACZKO. The things they are doing are good. I think they are a piece of the work that needs to be done. They are certainly not all of the work that needs to be done. And I think the staff has conveyed that to the industry as well.

So we certainly don't ever want to stand in the way of progress and of efforts to make safety better. There are more things that need to be done, though, than what the industry is proposing.

Mr. FRELINGHUYSEN. Of course. I take from the article, and you are welcome to back this up, that you are also of the opinion that our U.S. nuclear plants are safe.

Mr. JACZKO. As I said to Mr. Womack, I would say, yes, that they are all safe. There is one plant, however, that is not operating. The Commission has said that—the staff has said that that plant cannot operate until they meet a number of conditions which we have yet to really work through and identify. So I wouldn't say they are unsafe, but they currently are not operating, and at this point the staff would not be of the opinion that they could operate.

Otherwise, the plants are meeting our requirements, and some of them have challenges and need extra oversight, but otherwise they are safe.

Mr. FRELINGHUYSEN. Last year, I won't say I was a fly on the wall, but I sat in on one of Mr. Shimkus's hearings in the big room and had an opportunity—and we thought about doing it here, and we may do something at a later date—to hear the voices and opinions of some of those that you serve with. I thought it was valuable to me.

I am somewhat disturbed that there is this apparent and perhaps real friction between you and some of the other commissioners. But we hope and know that you are working on behalf of the public good, and we will be respectful of it.

Mr. Chairman, there are quite a few applications for new reactor licenses, and there are always the continuing issues of plant license extensions and power upgrades. Can you give us a picture as to what we should anticipate over the next several years? And, more importantly, since this is the Appropriations Committee, whether you have the funding levels in your budget to provide adequate staff to get these reviews done in an expeditious manner?

Mr. JACZKO. Right now, I feel very comfortable with the request that we submitted that we will have the resources to meet the necessary, I would say, demands of the applicants.

We have right now pending one license application which is near completion. That is for the Summer project.

Beyond that, there is one other new reactor application license that is in a more advanced state of review which could possibly come to final decisions in the next year perhaps or potentially longer depending on how we review or deal with some of the Fukushima events.

Beyond that, most of the license applications are a little bit farther out, maybe in fiscal year 2013, fiscal year 2014, and beyond for the license applications we have.

So there will be a bit of a break, in a way a pause, because of really just where we are in the review for these. But, again, none of that is inconsistent with what the applicants are needing in terms of their time line for getting an application——

Mr. FRELINGHUYSEN. Are you gearing up for the SMRs at all? In other words, I know there are some basic similarities here, but I wondered whether we were beating the drum for this. I think it has been bipartisan. I think the administration is supportive of it. I am not quite sure where you are, but, in reality, I think there is a general consensus that this is something that we want to be identified with and will be thoroughly vetted. Is this part of your overall budget picture and projections as well?

Mr. JACZKO. Absolutely. As I said earlier, we are really in a way waiting on the applicants right now. Our fiscal year 2012 request assumed that we would be receiving applications for designs for small modular reactors in fiscal year 2012. That is not going to happen. Right now, as Commissioner—as Secretary Lyons said——

Mr. FRELINGHUYSEN. He has been called a lot of things. And we thank you both for your service; and Mr. Lyons has, of course, been around for a long time, has a remarkable career and institutional memory, so we count on him.

Mr. JACZKO. As he said, we don't anticipate until late in calendar year 2013 receiving some of these applications for the small modular reactors. But we are preparing to receive those and are doing the work we need to do to be ready.

Mr. FRELINGHUYSEN. Mr. Pastor, anything else for the good of the order?

Gentlemen, we want to thank you for your time here this morning. I apologize for my absence during the hearing. We appreciate what you do every day and want to thank your staffs.

Since we have had a number of those representing the foreign media, again, we want to thank you and your staff for being heavily involved in supporting the Japanese people in their time of major crisis and anxiety; and the fact that your people were there to back them up and assist them I think is a mark that you ought to be very proud of.

So we stand adjourned.

QUESTIONS FOR THE RECORD

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on the 2013 Budget Request for the
Nuclear Regulatory Commission
and
Department of Energy's Nuclear Energy programs
Wednesday, March 7, 2012

NUCLEAR ENERGY

STATUS OF SMALL MODULAR REACTORS LICENSING PROGRAM

Subcommittee. Secretary Lyons, the fiscal year 2012 appropriation included $67 million to start the small modular reactor (SMR) licensing program. This Subcommittee was a strong proponent of that program, and I have a keen interest in watching the program progress.

A full two years has passed since the Department first proposed an SMR program, and it seems that you must have learned quite a bit about the state of this new area. Can you give us your current vision for small modular reactors and the promise they offer our energy sector?

Dr. Lyons. The Department continues to believe that SMRs have the potential to contribute notably to meeting the energy security, economic, and environmental goals of the United States. Development and deployment of SMRs domestically may provide an opportunity for the United States to meet clean energy goals, promote U.S. technological leadership in the nuclear field, and could help the U.S. industry compete in a potentially lucrative global market. If a fleet of SMRs were manufactured domestically, it would help reinvigorate the domestic manufacturing sector and act as an engine for U.S. job creation based on the associated construction, operation, and service positions that will be required. Finally, domestic deployment of SMR-based nuclear power would allow the United States to reduce greenhouse gas emissions.

Subcommittee. I understand that the Department released draft grant application guidelines in January. When do you expect the final guidelines to be released, and what is the timeline for choosing the two recipients?

Dr. Lyons. The Office of Nuclear Energy (NE) released the final version of the SMR funding opportunity announcement on March 22, 2012. The application deadline is 60 days later, on May 21, 2012. NE will then conduct a merit review and selection process with a goal of making the selection in the mid- to late-summer 2012. NE is currently looking for opportunities to accelerate this process.

Subcommittee. Dr. Lyons, we've discussed before the mounting international competition for small modular reactors. What is the urgency of us moving forward quickly with SMRs?

Dr. Lyons. I am aware of several international competitors that are making progress on developing their SMR designs, as well as their licensing process. The most mature competitive technology is the Korean SMART **(System-integrated Modular Advanced ReacTor)** design that is expected to receive a standard design approval (similar to the NRC design certification approval) from the South Korean nuclear regulator by mid-2012. This design and other foreign designs enjoy the support of their respective governments, creating an uneven playing field for the U.S. competition. I believe that there is an urgency to move forward with our domestic SMR program to accelerate the certification and licensing of U.S. designs as the international market for small reactors begins to grow, which is why our SMR Licensing Technical Support Program is so important.

Subcommittee. What are some of the advantages to our economy of SMRs? Is it correct that, unlike some of the largest reactors, the entire SMRs can be manufactured here in the United States?

Dr. Lyons. Large-scale, fleet-level deployment of SMRs can act as an engine for domestic economic growth. The development of SMRs may be critical as replacements for dozens of old coal plants that are expected to be decommissioned within the next few decades. The manufacture, factory fabrication, and operation of these SMRs can create thousands of mid to long-term, high-paying jobs. All of the domestic SMR designs can be manufactured using existing U.S. infrastructure and capability, something that cannot be said of the large LWR designs. Although the U.S. currently does not have the ability to fabricate the reactor pressure vessel and some steam generator forgings for large LWRs reactors, it can manufacture these components for all of the proposed SMRs.

Subcommittee. How many applications do you expect to receive, and do you expect to receive applications for both light water reactors and other advanced reactor designs?

Dr. Lyons. The Office of Nuclear Energy has received inquiry from a number of SMR vendors of both light water and non-light water technologies. There is no way to predict the exact number of applications that will be received, but we expect to get more than six.

Subcommittee. What are the risks of this program? What should we look out for?

Dr. Lyons. There are several risks that DOE needs to be concerned about with this program. Primarily, there is regulatory risk in that these SMR designs have not been licensed in the past. Although the light-water-based SMR designs are similar in principle to the large, 1000 MW nuclear plants that have been and are being certified and licensed, there are differences in structures, components, and operating philosophies that may result in protracted reviews. Non-light-water designs such as gas and liquid metal-cooled reactors may be even more challenging to license due to the lack of extensive design and operational experience with these technologies compared to light-water-based designs. Additional risks are introduced by the fact that deployment of SMRs by industry will be a complex economic decision based on several factors, including the cost of alternative energy options, energy supply diversity and potential GHG policy considerations.

Subcommittee. The request for the SMR licensing program is slightly below the request last year. Secretary Lyons, does the budget request put us on a trajectory to sufficiently fund this program for the next several years?

Dr. Lyons. Because the program funding was not provided until the end of calendar year 2012, and we must execute a complex and lengthy selection and award process for financial assistance, we anticipate having to carry over most of the FY12 funding into FY13. At that point, the approximately $132 million would be available to invest in SMR certification and licensing efforts through FY13. The Office of Nuclear Energy believes that this budget is appropriate to sustain the program through FY13, but we will need to increase the budget requests in the outyears in order to meet the program goals of accelerating the completion of the certification and licensing for the awarded projects. The DOE Office of Nuclear Energy intends to request the balance of the required program funding ($320 million) in fiscal years FY14-FY16.

Subcommittee. The Department indicated last year the program would cost a total of $452 million, and the President's budget this year includes a second installment of $65 million. Has the overall estimate changed, or is it holding steady?

Dr. Lyons. The overall estimate has not changed. As stated above, we will have approximately $130 million as the awards are completed at the beginning of FY13 and the outyear budgeting process will be informed by the recipients of the cooperative agreements as work progresses.

Subcommittee. When would be the last fiscal year of funding?

Dr. Lyons. The Department envisions a 5-year, $452 M program in which funding would begin in FY 2012 and conclude in FY 2016.

SMALL MODULAR REACTOR ADVANCED RESEARCH AND DEVELOPMENT

Subcommittee. Dr. Lyons, fiscal year 2012 established a new research program for advanced small modular reactor concepts.

What is the status of this research program? Has research begun?

Dr. Lyons. The key opportunities in advanced concepts include safety, long lived cores, higher operating temperatures, transmutation capability, and greater proliferation resistance. The advanced concepts incorporate passive safety features and inherently safe designs which provide improved safety characteristics. Improved fuels will result in longer lived reactor cores that require infrequent, if any, refueling. Higher operating temperatures will allow use of these reactors in process heat applications and for coupling with more efficient energy conversion systems such as a Supercritical CO_2 Brayton Cycle. Fast spectrum reactors may have a role in transmutation of actinides from used fuel which would assist in resolving long term fuel cycle issues. These designs may also have additional proliferation resistance and physical protection advantages.

Subcommittee. What do you think are the big opportunities in advanced concepts? Is it in the economies? The manufacturing? The safety? Or designs with strengths in other areas?

Dr. Lyons. The key opportunities in advanced concepts include safety, long lived cores, higher operating temperatures, transmutation capability, and greater proliferation resistance. The advanced concepts incorporate passive safety features and inherently safe designs which provide improved safety characteristics. Improved fuels will result in longer lived reactor cores that require infrequent, if any, refueling. Higher operating temperatures will allow use of these reactors in process heat applications and for coupling with more efficient energy conversion systems such as a Supercritical CO_2 Brayton Cycle. Fast spectrum reactors may have a role in transmutation of actinides from used fuel which would assist in resolving long term fuel cycle issues. These designs may also have additional proliferation resistance and physical protection advantages.

Subcommittee. The request cuts funding for this new research program by 36 percent. Does that reflect a waning interest in this area by the

Administration? And how is that consistent with the last two years, when the Administration proposed to start this new program, touting its promise?

Dr. Lyons. No, the Administration maintains a strong interest in the Small Modular Reactor (SMR) Advanced Concepts R&D Program. The proposed budget reflects the Administration's desire to continue to support longer term advanced R&D while also supporting the near-term deployment of SMRs through the SMR Licensing Technical Support Program. That program is a cost-shared program with vendor/utility teams for the design, design certification and licensing of up to two SMR designs.

REDUCTION TO REACTOR CONCEPTS R&D

Subcommittee. Secretary Lyons, the budget request reduces funding for Reactor Concepts Research and Development substantially. While the Department requested $125 million for that program in fiscal year 2012, it asks for less than $74 million this year. This program includes several important programs, including Small Modular Reactor advanced concepts research, the Next Generation Nuclear Plant, Light Water Reactor Sustainability, and other advanced reactor research.

Does the budget request mark a change in strategic direction since last year? If so, what precipitated these changes?

Dr. Lyons. The President's budget request does not mark a change in strategic direction, but rather reflects some difficult resource allocation choices. Overall, the Reactor Concepts Research, Development and Demonstration Program request was reduced by nearly 36 percent, relative to the FY 2012 enacted level. The allocation of available resources is consistent with our strategic goals in the reactor areas, extending the life of the current reactor fleet and improving the affordability of new reactors.

While each of the four subprograms within this budget element were reduced, the Light Water Reactor Sustainability program was least impacted. This program addresses near-term activities supporting the safe, long-term operation of the current fleet of 104 nuclear power plants. These plants provide the vast majority of our carbon-free electricity production and are a vital clean energy asset.

The other programs within Reactor Concepts Research, Development and Demonstration include technologies that have a longer timeframe for commercialization, and will depend to a large degree on future fuel cycle, uranium resources and waste management considerations. The Department chose to focus its limited resources on research and technology development activities that have a higher potential for near-term deployment and commercialization. We will pursue every opportunity to leverage our efforts with universities, industry and the international community.

Subcommittee. The request proposes to cut nearly in half the Advanced Reactor Concepts research program. Dr. Lyons, what research would be cut from this program?

Dr. Lyons. The Advanced Reactor Concepts research and development program remains an important program for the Department. Reflecting difficult resource allocation choices, R&D activities associated with lead/lead-bismuth and fluoride high temperature reactors will be significantly reduced. The energy conversion R&D, which includes supercritical CO_2 turbomachinery and related heat exchangers, will be consolidated under the Small Modular Reactor Advanced Concepts R&D Program in Fiscal Year 2013. Impacts to sodium-cooled fast reactor R&D will be minimized as much as possible given this concept's potential role in addressing fuel cycle issues, and in order to sustain collaborations conducted under shared international programs such as the Generation IV International Forum and various bilateral international agreements.

Subcommittee. What are the potential advantages of that kind of reactor? In other words, what would we be missing by terminating this research line?

Dr. Lyons. Advanced reactors offer potential advantages of improved safety and reliability, economics, sustainability, and proliferation resistance and physical protection. Improved safety and reliability can be achieved from the use of passive safety features, advanced fuels and inherently safe design features. These designs will strive to achieve an extremely low likelihood and degree of reactor core damage. Economic advantages may result from use of more advanced materials, improved availability, longer lived cores, reduction in commodities, and improved operating efficiencies. Fast spectrum reactors can provide improved sustainability through the transmutation of actinides which may assist in resolving long term fuel cycle issues. Advanced designs will also improve proliferation resistance and physical protection by improved security and preventing the diversion or theft of weapons-usable material.

This research, when coupled with research supporting the deployment of small modular concepts, advances the state of reactor technology to improve its competitiveness, and help advance nuclear power as a resource capable of meeting the Nation's energy, environmental and national security needs.

REDUCTION IN MANUFACTURING AND NONPROLIFERATION RESEARCH

Subcommittee. In last year's budget request, the Department proposed a new Crosscutting Technology Development program, to research areas that would benefit all nuclear reactor research. The 2012 budget request asked for $41 million, and we were able to provide $36 million in the final appropriation — an amount that could certainly get this worthwhile program off the ground.

It was surprising, then, to see that this year's budget request reduced funding for this program by 27 percent, and would eliminate both research developing proliferation-resistant technology and research into advanced manufacturing.

Given the President's push for manufacturing research, why is the Administration proposing to cut the advanced manufacturing program?

Dr. Lyons. The Advanced Methods for Manufacturing (AMM) program is an important program that aligns with the President's economic efforts by providing research, development, and demonstration on innovative methods for the manufacturing of nuclear components and equipment. Projects will be initiated at the end of FY 2012 through a competitive process that will continue in FY2013 through the end of FY2014. AMM also plans to issue a roadmap in FY 2012 to guide future solicited research and technology development in the event that funding is available in future years.

Because of the ongoing projects, the Department decided to defer additional AMM projects in FY13 so that it could support other important areas within this account rather than spreading the budget reduction to the other subprograms that were already at minimum levels. The Nuclear Energy Advanced Modeling and Simulation, the Reactor Materials, and the Advanced Sensors and Instrumentation subprograms are priorities because they have the potential to make the greatest impacts in nuclear technology development, provide needed capabilities common across NE R&D programs, deliver enabling technologies beyond individual programs, create capabilities needed by the NE R&D enterprise, and undertake high risk research to overcome design limitations. Thus, the AMM subprogram was deferred to provide a stronger support to these priority programs.

Additionally, other agencies are promoting advanced manufacturing; for example, the National Institute of Standards and Technology is requesting funding in FY 2013 to help test and accelerate the development of new technologies created in the advanced manufacturing sector. NE will work with NIST and standards setting bodies to make sure implementing codes and standards are available to support new AMM technologies.

Subcommittee. So there is no other work that could be done or supported in advanced nuclear manufacturing for at least 3 years?

Dr. Lyons. At the end of FY 2012, NE will award three-year projects for Advanced Methods for Manufacturing (AMM). These projects will continue research in FY2013 through the end of FY2014. Some projects in AMM that were awarded through the Nuclear Energy University Programs (NEUP) in FY 2011 will continue through FY 2013 and new AMM research will be requested through NEUP in FY 2013.

Subcommittee. Can you describe the proliferation work done under this program to date, and what differentiates it from nonproliferation work under the National Nuclear Security Administration (NNSA)?

Dr. Lyons. This activity was begun in 2010 in the Advanced Fuel Cycle Initiative within the Materials Protection, Accounting, and Control Technologies (MPACT) program as a means to assess and understand proliferation risk using already established methodologies in the world of risk management. It was removed from MPACT and formalized into an element in NEET for the FY11 budget year. However, since we were unable to begin a new program under the FY11 Continuing Resolution and the FY12 budget was just passed in December, 2011, no work has been done under the program except to ensure the administration of the program was in place, including the funding. The work begun in March 2012 will consist of developing and applying innovative proliferation/terrorism risk assessment approaches by interdisciplinary laboratory/university teams.

These assessments will focus on selected nuclear energy systems of current interest to the Office of Nuclear Energy and aim to demonstrate best practices and highlight gaps in existing methodologies. This work will help focus domestic nonproliferation R&D work to ultimately inform the designers and decision makers in the U.S. about what design considerations should be made so that future US fuel cycle designs take into account the most important nonproliferation features. Non-proliferation work conducted by NNSA is focused primarily on analyzing current proliferation vectors in foreign countries to prevent such proliferation; therefore, their attention is on international components of nonproliferation including international nonproliferation policy, developing and implementing programs internationally, and nuclear security.

Subcommittee. Why was nonproliferation research deemed low-priority here, when the Administration has made nonproliferation programs in the NNSA a considerable priority?

Dr. Lyons. In general terms, nonproliferation programs in the NNSA are of high priority because they deal with current and impending threats to national and international security. There are mission-specific operations and ongoing activities that aim to increase nuclear security worldwide by working with foreign governments to secure nuclear material worldwide, to engage with other countries' regulatory authorities to promote nonproliferation and security best practices, and in some cases to acquire special nuclear material from foreign entities for disposition in the United States. The Office of Nuclear Energy, on the other hand, is conducting comprehensive nuclear research which is ultimately for domestic deployment. As such, potential proliferation issues associated with future deployment are just one of the factors that must be understood and addressed. Thus, the nonproliferation efforts in NE are directed mostly at understanding how technology and fuel cycle type may affect future decisions on domestic R&D, and eventually design considerations of such nuclear systems.

FOLLOW-ON RESEARCH AFTER FUKUSHIMA

Subcommittee. Dr. Lyons, the tragic events in Japan last March have provided much fodder for reflection over the last year — not only for Chairman Jaczko's agency, but for yours office as well. Now that the better part of a year has passed since the events at Fukushima, it seems timely to consider how the Department has reacted and adjusted.

I know you were extremely busy last March as the Department and the NRC helped with the events at Fukushima. How has your office assisted Japan since then, and does the budget request include any funding for additional assistance?

Dr. Lyons. The Office of Nuclear Energy (NE) was engaged in assistance activities from the early stages of the Fukushima Daiichi accident. In the immediate aftermath of the accident at Fukushima, the Department activated its Emergency Operations Center where I assigned my staff to focus on providing technical assistance to the Japanese and on monitoring radiation releases and impacts in both the U.S. and Japan around the clock. I also deployed representatives from my office and several national laboratories to augment the staff at the DOE office in Tokyo to provide technical assistance to the U.S. Ambassador to Japan and the Japanese government. During the first several weeks following the accident, NE assembled a team of experts from our staff and the National Laboratories to provide a significant and diverse set of analyses to support accident management at Fukushima Daiichi, including a passive cooling assessment, development of options for accelerated cooling; analysis of spent fuel pool leakage scenarios; and examination of reactor pressure vessel steel corrosion. In the months following the accident, my office continued to support the government of Japan by performing peer reviews and analysis, as requested, collecting data to support lessons learned and monitoring potential accident consequences.

In other parts of the Department, the National Nuclear Security Agency deployed its Airborne Monitoring System and Consequence Management Response Teams to monitor radiological fallout and provide data to the U.S. and Japanese governments. Also, my office and the Office of Environmental Management provided equipment such as remotely operated robotics, radiation hardened cameras, and radiation sensors and monitors, as well as developed concepts for collection, transfer, storage and treatment of waste water.

We continue to remain cognizant of the state of the reactor and conditions around the plant and stand ready to respond to any further requests for assistance. My office is jointly sponsoring with the Nuclear Regulatory Commission (NRC) a reconstruction study of the accident using the severe accident code MELCOR to assess our severe accident modeling capability and validate the MELCOR code itself by demonstrating that it reasonably reproduces observed plant conditions and the accident sequence of events. My staff and NRC has discussed this study with Japanese government and industry stakeholders and Japan has expressed interest in collaborating through discussions, providing peer reviews or participating in a workshop, though as of yet no agreements have been reached.

My office's support was provided through the Light Water Reactor Sustainability Program. Although we have not requested additional funds in the FY13 President's Budget specific to Fukushima support activities, lessons learned from the event will be incorporated into our reactor and fuel development research portfolio.

Subcommittee. Beyond offering assistance, it is also important that we learn from Fukushima and further improve our nuclear technologies through research activities at the Department of Energy. What activities has the Department begun or ramped up in the last year to that effect, and what activities does the budget request propose or continue?

Dr. Lyons. DOE has identified several key potential areas for additional focus including investigating fuel types for LWR applications that have improved performance during accidents. The MELCOR severe accident code reconstruction study my office is jointly sponsoring with the NRC will enhance our understanding of severe accident progression and our predictive capabilities. This can lead to reactor plant design and operational procedures with improved accident performance. Other potential areas for additional focus may include further seismic studies. Research in new reactor technologies will also seek to further enhance safety through the prevention or mitigation of severe accident scenarios.

RESEARCH INTO SAFER FUELS, BOTH PRE- AND POST-FUKUSHIMA

Subcommittee. After the events in Japan last year, much of the attention here at home turned to how the NRC will decide to modify our reactor requirements to ensure public safety in even the most unlikely circumstances. That said, Secretary Lyons, it struck me how many Nuclear Energy research and development programs already focus on the task of developing even safer fuels and reactor designs, some of which can be used in today's reactors. Let's discuss a few.

The Next Generation Nuclear Plant program has made strides in the development of so-called TRISO fuel. Can you describe what this fuel is, and its safety advantages?

Dr. Lyons. TRISO (tri-material, isotropic) coated particle fuel consists of a fuel "kernel" surrounded by a series of engineered layers: a porous pyrocarbon buffer layer, a high-density inner pyrolytic carbon layer, a silicon carbide layer, and lastly a high-density outer pyrolytic carbon layer. These layers provide containment of radionuclides and fission product gases produced during normal operations, as well as those produced during postulated accident conditions where the fuel temperatures can reach up to ~1600 degrees Celsius.

TRISO-coated particle fuel deployed in high temperature gas cooled reactors provides enhanced irradiation performance characteristics, larger safety margins, and superior fission product retention during postulated accidents thereby reducing potential radiological releases. TRISO fuel is also an excellent engineered barrier for long-term retention of radionuclides in a repository environment. Irradiated TRISO particles have been tested at very high temperatures well beyond design basis accident conditions and have demonstrated exceptional safety performance.

Subcommittee. When could TRISO fuel be deployed in our existing reactors? What are the barriers to doing so?

Dr. Lyons. An extensive R&D program to explore the use of TRISO-coated particle fuel in light water reactors (LWR) could be undertaken to examine alternative matrix materials, alternative cladding materials, needed enrichment levels, and new fuel performance and safety models for use in current reactors. This new fuel configuration would have to be tested extensively for its irradiation performance for normal and accident plant conditions and compared against current LWR fuel design margins. Tests would have to be conducted in current LWR cores for licensing by the NRC. This process would take 10-15 years, depending on funding, NRC acceptance, and willingness of a utility to test fuel in an existing reactor. Investigation of TRISO particles embedded in SiC matrix has begun at Oak Ridge National Laboratory under the LWR Sustainability Fuels and Fuel Cycle Development "Accident Tolerant Fuel" Programs to determine how the SiC matrix and TRISO particles interact.

Subcommittee. Does the budget request fully fund TRISO fuel activities?

Dr. Lyons. The Fiscal Year 2013 request of $21,157,000 for the Next Generation Nuclear Plant (NGNP) program is sufficient to fund the TRISO fuels research. This includes performance of key irradiation and post-irradiation examination activities necessary for TRISO fuel qualification.

Subcommittee. The Light Water Reactor Sustainability program has also focused on some significant technological steps in accident-tolerant fuel, and on other post-Fukushima work. The Advanced Fuels program similarly plays a key role in the Department's Accident Tolerant Fuels Initiative. Can you describe the safety-focused activities in these two programs, and any shifts in those activities in this year's request?

Dr. Lyons. The Light Water Reactor Sustainability (LWRS) program has been exploring the viability of silicon carbide cladding as a replacement for zirconium-based cladding to enhance both the performance and safety of existing reactors. In Fiscal Year 2012, we plan to contract with three industry teams to develop a technology for a robust end cap seal, which is a key technical barrier. Next year, in Fiscal Year 2013, we plan to begin in-reactor testing of prototypical fueled silicon carbide cladding samples to better understand their behavior in the harsh environment of a nuclear reactor.

The Fuel Cycle Research and Development (FCR&D) program has initiated an Accident Tolerant Fuels Initiative as part of their advanced fuel development efforts. In Fiscal Year 2012, this program will initiate an effort to integrate industry, universities, the national laboratories, and the Nuclear Regulatory Commission for development of fuel with enhanced accident tolerant characteristics for application in present and future Light Water Reactors. In Fiscal Year 2013, the program will initiate out-of-reactor testing to select candidate materials for further testing including in-reactor steady state and transient tests. The goal of these efforts will be to permit selection in four years of one or two candidates for an assembly scale demonstration in a commercial reactor within ten years.

Subcommittee. Given the focus on fuel safety, why does the budget request cut both of these programs – including cutting Advanced Fuels by nearly one third?

Dr. Lyons. The Advanced Fuels subprogram covers a broad range of fuel concepts, including the new effort to develop light water reactor fuels with enhanced accident tolerant characteristics. Therefore, under the realities of existing budget pressures we will be slowing the progress of some concepts whose impact are significantly far into the future. We will refocus on the higher priority accident tolerant fuel initiative as it has near term implications. Concepts such as nitride, mixed oxide, and metallic fast reactor fuels are still recognized as important and will continue but development and demonstrations will be delayed.

Subcommittee. Before we move on, are there other major activities you'd also like to mention that focus on make our operating reactors even safer?

Dr. Lyons. In May, as part of our Nuclear Energy University Programs, we plan to issue two Integrated Research Projects (IRPs) related to safer reactors. The first would be an IRP to develop advanced light water reactor with inherent safety features. These would be similar to the GEN III+ designs that already include passive safety features, but with additional safety capabilities if they should ever reach a beyond-design-based condition. The other IRP would be to develop advanced cladding materials and/or fuel-cladding concepts with enhanced accident tolerant characteristics for use in existing reactors.

IMPORTANCE OF NUCLEAR EXPERIMENTAL FACILITIES

Subcommittee. Secretary Lyons, in addition to a variety of research activities, the Office of Nuclear Energy overseas a complex of experimental infrastructure that plays a key role in moving our nation's nuclear energy technologies forward. Can you share your views on the role and importance of the Department's experimental facilities, as well as on any notable changes in the budget request?

Dr. Lyons. The Office of Nuclear Energy's (NE) unique experimental facilities and capabilities at the Idaho National Laboratory, such as the Advanced Test Reactor (ATR) and post-irradiation examination equipment located at the Materials and Fuels Complex, play vital roles in both furthering nuclear energy research and development and in attracting, training, and retaining highly skilled scientists and experimenters. For example, the ATR National Scientific User Facility provides funding for universities and other non-profit organizations to utilize ATR and for research experiments. Without these capabilities, the U.S. would have a difficult time keeping pace with other nation's research efforts.

Based on the Nuclear Energy Roadmap, NE has identified infrastructure gaps to support the design and development of new and accident tolerant fuels. To close these gaps, the fiscal year 2013 request for NE includes a new line construction project to establish advanced post-irradiation examination capabilities to improve the understanding of radioactive and irradiated material behaviors at the nano- and subatomic scales. Additionally, the NE request continues efforts to identify alternatives to resume transient nuclear fuel testing. Transient nuclear fuel testing is required to assess and validate new accident tolerant fuels in a wide-range of environments to understand and predict their performance. The United States last conducted transient nuclear fuel testing in 1994 at the Idaho National Laboratory Transient Reactor Experiment and Test (TREAT) facility.

NEXT GENERATION NUCLEAR PLANT RESEARCH

Subcommittee. The Next Generation Nuclear Plant program supports a number of important research activities, including work to test and qualify so-called "TRISO" fuel that can withstand very high temperatures with unprecedented safeguards against the release of radioactive gas. In addition, the program supports research into graphite reactor materials, high temperature materials, and other areas that are necessary for high-temperature gas reactors, and can substantially increase safety margins in light water reactors.

The budget request, however, only includes $21 million for Next Generation Nuclear Plant research and development work, cutting the program almost in half compared to the current year.

Does the request include sufficient funding to continue all of these activities?

Dr. Lyons. The Fiscal Year 2013 request of $21,157,000 for the Next Generation Nuclear Plant (NGNP) program is sufficient to fund the research activities in fuels and graphites, including essential irradiation and post-irradiation examination.

Subcommittee. What ongoing research within the Next Generation Nuclear Plant program are we halting at the proposed funding level?

Dr. Lyons. While there is no specific funding for computational design methods development and experimental validation included in the Fiscal Year 2013 request for the Next Generation Nuclear Power Plant program, we hope to be able to continue support for this area of research through key targeted projects within the Nuclear Energy University Program.

NEXT GENERATION NUCLEAR PLANT PUBLIC/PRIVATE PARTNERSHIP

Subcommittee. Dr. Lyons, the Nuclear Energy Advisory Committee last year recommended to you that the Next Generation Nuclear Plant (NGNP) demonstration project — the so-called "Phase 2" design and construction — was not ready to be funded. Instead, it recommended continued research and development under the NGNP program.

It also recommended that the Department create a formal public/private partnership with an industry consortium in order to facilitate the exploration of an NGNP demonstration project, and further determine its feasibility. Your 2013 budget request states, in fact, that in fiscal year 2011 the Department would establish a public-private partnership.

Has your office formed such a partnership?

Dr. Lyons. The NGNP public-private partnership has not yet been formed, but we are taking steps that will facilitate the formation of such a partnership in the future.

Subcommittee. Why not? Where are the roadblocks, the "public" or the "private" side of this partnership?

Dr. Lyons. To begin the process of establishing a partnership with industry to develop High Temperature Gas Cooled Reactors (HTGR), the Department has recently issued a solicitation to obtain analyses, data and information on the long term commercial viability of HGTR technology. The scope of the anticipated contract has two parts. The first is to develop a credible economic/ business analysis detailing how industry may best engage in developing and commercializing the HTGR technologies as well as their potential benefits to the nation's energy security. The second is to provide data and analysis to the Department that could inform HTGR research and development efforts. The information provided will be used by the Department to inform future decisions regarding formation of the public-private partnership.

Subcommittee. Do you intend to form it? What is the timeline for forming this partnership?

Dr. Lyons. The Department envisions one to three years of continued engagement with industry on topics related to the commercialization of HTGR technology, while simultaneously performing key R&D, and continuing engagement with the Nuclear Regulatory Commission on HTGR licensing issues. We anticipate that a public-private partnership would be formed following this period of continued preparation.

Subcommittee. It seems that, while the Advisory Committee and the budget request recommended the formation of the partnership, the Department does not really intend to do so — or it does not intend to move forward with a demonstration project anytime soon. When will the Department just say whether or not it recommends the demonstration project be pursued?

Dr. Lyons. The Department recommends continued funding for the Next Generation Nuclear Plant Demonstration Project activities as spelled out in the Fiscal Year 2013 request. Given current fiscal constraints, competing priorities, and projected cost of the prototype, the Department will not proceed with design or construction activities at this time. The Project will continue to focus on high temperature reactor research and development activities, interactions with the Nuclear Regulatory Commission to develop a licensing framework, and establishment of a public private partnership until conditions warrant a change in direction.

IDAHO SAFEGUARDS & SECURITY FUNDING MOVED INTO NUCLEAR ENERGY

Subcommittee. Secretary Lyons, the Administration proposes to move $95 million for Idaho Safeguards and Security from Other Defense Activities into your Nuclear Energy program. It's probably no coincidence that the budget request proposes to fund Nuclear Energy at about the fiscal year 2012 level — and reduces the existing Nuclear Energy program by about the amount of this Safeguards and Security line item. We'd like to find out whether this is purely a budget gimmick to hide that cut, or if the move has merit — or both.

Is there merit to moving this safeguards and security line into the Nuclear Energy program?

Dr. Lyons. The request to transfer the Idaho National Laboratory (INL) Safeguards and Security (S&S) program from the Other Defense Activities (ODA) Appropriation to the Nuclear Energy (NE) Appropriation did not impact the overall NE funding request level. It is just a coincidence that the total cost of the transfer was similar to the overall reduction in the NE Appropriation.

The Department believes there is merit in transferring the INL S&S program into the NE Appropriation. This transfer is consistent with how the Department requests funds for other S&S programs. The request also aligns all NE programs within one appropriation, which will allow trade-offs among NE programs without impacting non-NE programs within the ODA Appropriation. It should be noted that the INL S&S will remain segregated within the NE Appropriation as it retains the defense funding designation. While this is not optimal, it is not seen as a significant operational impediment and the Department views this "cost" being more than justified by the "benefit" of aligning INL S&S with other NE and INL infrastructure funding.

DEEP BURN FUEL RESEARCH

Subcommittee. Secretary Lyons, the "Deep Burn" fuel program has been exploring ways to extract much more energy from a given quantity of nuclear fuel — and therefore significantly reduce the amount of fuel we need to power our reactors, and the amount of waste those reactors produce. I understand that this activity overlaps with some other fuel-focused programs in your purview, but the budget request this year does not mention the deep burn program.

The budget request implies that his program has largely been repurposed to focus on safety. Can you clarify the Deep Burn program's current focus, and whether it retains any of its original purpose of increased fuel utilization and reduction of transuranic byproducts?

How is this program progressing, and how does it fare in the budget request compared to the previous several years?

Dr. Lyons. The deep burn effort is integrated into the broader Advanced Fuels subprogram, which has a priority focus on enhancing the safety and performance of light water reactors (LWRs). Efforts are continuing to advance the concept of deep burn as it may contribute to LWR fuel goals. While it is not specifically called out in the budget request, the deep burn effort is still important for its potential related to improved performance and resource utilization. The value of using deep burn concepts for the reduction of transuranic byproducts is still important to the long-term objectives of the program and is therefore being given full consideration under the fuel cycle options screening process within the Systems Analysis and Integration subprogram.

MODELING AND SIMULATION ENERGY INNOVATION HUB

Subcommittee. Dr. Lyons, fiscal year 2013 will be the fourth year of funding for the Nuclear Energy Modeling and Simulation Energy Innovation Hub funded within your office. As we enter the fourth year of a five-year term, you can imagine we want to see some results from the nearly $100 million invested through fiscal year 2013.

Dr. Lyons, what are some key accomplishments the Hub has achieved thus far?

Dr. Lyons. The official start date for the Nuclear Energy Modeling and Simulation Energy Innovation Hub was July 1, 2010. Since its inception the Hub has made several key accomplishments including:

- Working closely with their industry partners (Westinghouse, EPRI, and TVA) to identify key nuclear fuel issues which are limiting the performance of existing reactors and reducing the amount of nuclear energy generated electricity.

- The Nuclear Energy Hub has assembled an outstanding team of experts from industry, the national laboratories and universities that are integrating existing relevant codes and have created an early version of the "virtual reactor." The virtual reactor is being used to visualize all the physics occurring inside the reactor core, including coolant flow, temperatures and neutron fluxes in full three-dimensions. This will be used to understand and address nuclear fuel performance issues.

- The Hub has established research activities that are producing new and improved physics codes that will greatly improve the power of the virtual reactor. This research has already resulted in new discoveries about the formation of deposits on the nuclear fuel which can limit performance.

- Also, during the first year the Hub established a strong foundation that will lead to successes over the remaining period of the award. These accomplishments include the creation of a "one roof" collaboration facility that allows researchers from different scientific fields and institutions to interact both in one physical location and to use the latest electronic technologies for "virtual" collaborations.

Subcommittee. The Hub is tasked with creating a computer model that simulates a nuclear reactor and its fuel. But a model is only useful if someone uses it. Who will be the first "users" to benefit from the model? Will the model only be used by in-house Hub staff, or will it be used by other groups, including industry, academia, and government institutions like the Nuclear Regulatory Commission?

Dr. Lyons. The NE Modeling and Simulation Hub team recognized this important point early on and integrated key nuclear energy stakeholders onto the team to serve as "early users" of these codes. Westinghouse Electric Company, the Electric Power Research Institute (EPRI), and the Tennessee Valley Authority (TVA) all provide critical value to the Hub by ensuring that modeling and simulation research is focused on important issues for improving fuel and reactor performance. These companies also provide existing simulation codes and experimental data that will be used to validate the accuracy of the virtual reactor.

One of the first actions that will be taken by the Hub to deploy its technology will be the establishment of "test stands" at Westinghouse, EPRI, and TVA. These test stands will deploy the Hub developed modeling and simulation capabilities to put them into the hands of industry users who will assess how well they address their issues.

It was also recognized that the value of the Hub products will increase if the broader stakeholder community uses these capabilities. For this reason, the NE Hub established an Industry Council lead by EPRI. The council meets three times a year and consists of 18 outside companies including nuclear energy technology vendors, electric utilities, software companies, and computer vendors that are interested in utilizing Hub products.

The Hub team also includes three university team members, North Carolina State University (NCSU), the Massachusetts Institute of Technology (MIT), and University of Michigan which will use NE Hub products to inform and improve nuclear energy research. These efforts will also be extended to many more students, post docs and researches across the country via the Hub's educational outreach program.

Finally, the NE Hub continues to make robust efforts to reach out to relevant government agencies to inform and educate these groups of the Hubs advancements. This includes regular meetings with representatives from the NRC and recently briefing two of the NRC commissioners on the Hub activities. The Hub is also in reaching out to representatives from the Naval Reactors program through its laboratories.

Subcommittee. Did the Hub's missions and activities change at all in response to the events at Fukushima, Japan, last year? If so, how?

Dr. Lyons. The mission of the NE Modeling and Simulation Hub is to focus on the creation of a "virtual reactor" of existing, operating reactors. Through a competitive process, the team that was selected is focusing on Pressurized Water Reactors (PWR). This mission has not changed.

However, the events at Fukushima Dai-ichi have caused the Hub to increase the priority of its safety work. This includes creating modeling and simulation capabilities to better understand the implications of accidents like Loss of Cooling Accidents (LOCA) and calculation of subsequent peak fuel cladding temperatures.

The Hub is focusing on creating a baseline simulation capability of existing reactors that will be validated with data from those reactors. Once that is done, this "simulation toolkit" will be able to be adapted and applied to a variety of reactors and their safety issues.

NEAR-TERM, MID-TERM, AND LONG-TERM RESEARCH BALANCE

Subcommittee. Secretary Lyons, in every Energy Department program and up here in Congress, there is ongoing debate over whether we should be investing in science and technologies with near-, mid-, or long-term prospects. Budgets are tight, and these discussions are as important as ever since we cannot simply "do it all."

Nuclear Energy is no different, and activities range from improvements in operating reactors, to experimental reactor design and materials research that can make an impact decades from now.

Secretary Lyons, how does this balance among near-, mid-, and long-term work shift between fiscal year 2012 and the 2013 budget request?

Dr. Lyons. Our budget request attempts to balance support for near and long-term research. These efforts will always tend to be in competition for resources and it is important to keep them in balance. In the case of this year's request, there is a general shift away from longer term research towards activities with a more near term focus. That said, we continue to support long term research in areas of advanced reactor designs and advanced fuels. We also continue to support the potentially game changing, but long term, effort investigating sea-water uranium harvesting.

Subcommittee. In absolute terms, where is emphasis in the budget request? Is most of the research geared the near-term, long-term, or somewhere in between?

Dr. Lyons. In absolute terms our R&D programs will probably always skew to the mid- and longer term. Not only because we expect industry to focus on the most immediate concerns of industry and thus our very near-term work will always be minimal. But also because the very nature of our R&D programs are long term, for example a fuel development program will routinely take 15-20 years.

EXTRACTION OF SEA WATER URANIUM

Subcommittee. The budget request proposes funding for the second year of a new research program aimed at making the extraction of seawater uranium, a nearly inexhaustible source of nuclear fuel, into an economically viable option.

Clearly, mined uranium is cheap and plentiful enough to power the world's nuclear reactors for quite some time. When do you expect seawater uranium to become a necessary fuel resource?

Dr. Lyons. Given the nascent stage of the technology, it is difficult to predict when seawater extraction technology will become cost competitive with conventional uranium land mining. However, the extraction of uranium from seawater activity is a "game-changing" approach to address the long-term sustainability of nuclear fuel resources. Based on published Japanese data, about 70% of the seawater uranium recovery cost was due to the cost of the adsorbent materials. The Fuel Resources subprogram aims at developing more efficient and cost effective adsorbent materials by taking advantage of recent advancements in nanotechnology. The successful development of nanoscale adsorbents is expected to significantly reduce the technology cost. Preliminary results obtained by our program have shown superior performance in synthetic seawater. Continued R&D in innovative nanoscale materials is anticipated to further reduce the overall technology cost. Once the seawater uranium extraction could approach cost parity with mined uranium, the technology would become a necessary supplier of essentially an inexhaustible source of domestic nuclear fuel.

Subcommittee. The request increases funding for this activity by about $3 million. Although that's small by our overall program's standard, it's nearly double last year's level — and is nearly the only program that sees an increase in your Nuclear Energy budget request. What are the future funding requirements for this program, if it meets the milestones you hope?

Dr. Lyons. The budget request in FY 2013 calls for a critical expansion in the program scope to target key performance barriers. One major milestone is to achieve the targeted goal of doubling the published Japanese uranium adsorption capacity by the end of FY 2013. If this goal can be met, the technology development will progress into the next stage which will focus on further optimization of the technology and exploring (but not starting) further scale-up options. Future funding requirements will be assessed and established based on the progress of technology development. A comprehensive program review is planned in FY 2014. The review results will help guide future funding decisions. It is also anticipated that if research and development is successful then the program will seek industrial partners to cost-share the final development phase of the technology for commercial applications.

Subcommittee. How are the proposed activities different than last year to warrant the increase in funding?

Dr. Lyons. The increase in funding in FY 2013 will be focused on establishing marine testing facilities to validate the performance of newly developed adsorbent materials. This is a critical step to confirm the performance of novel sorbent materials under real seawater environments. The other new components of the FY 2013 program will include the uranium sorption and desorption kinetics as well as the initiation of the study of the biological effect of sorbent materials. Insights gained through these activities will help further refine the design for developing a robust and scalable technology platform.

INTERNATIONAL NUCLEAR ENERGY COOPERATION

Subcommittee. Dr. Lyons, the budget request proposes $3 million for the second year of the new International Nuclear Energy Cooperation, to aggregate international activities across the Nuclear Energy program into one office. This program supports a variety of activities with and in a number of countries.

During the fiscal year 2012 process, Members of the House expressed deep concern over other Department of Energy programs conducting energy assistance work in other nations. In many cases, that work benefited other countries but provided little value to the U.S. taxpayers who funded it. What is the rationale here for doing work in other countries, and should House of Representatives members have the same concern?

Dr. Lyons. International cooperation enables the Office of Nuclear Energy (NE) to leverage Federal technical expertise in civil nuclear energy issues and support the U.S. nuclear energy industry. The International Nuclear Energy Cooperation (INEC) budget supports country-specific engagement with potentially valuable R&D and/or commercial opportunities for our industry and building a foundation for collaboration on key areas. Bilateral and multilateral nuclear energy engagement also supports the safe, secure, and responsible expanded use of nuclear power throughout the world in a safe and secure manner. Given the important challenges associated with the use—and potential misuse—of nuclear energy around the world, it is vital that all nations with existing or new nuclear power programs are actively involved in global efforts to address the safety, security, and safeguards implications of nuclear power. The INEC program supports addressing these challenges and realizing the President's vision for an international nuclear framework with strengthened global standards for safety, security, and nonproliferation.

Subcommittee. Are there other international activities across the Office of Nuclear Energy, or does this $3 million represent the sum total of such activities?

Dr. Lyons. NE's core research and development programs fund the international activities conducted through the Action Plans and other international initiatives coordinated by NE-6 with part of its $3M budget.

Subcommittee. The budget request indicates that approximately 60 percent of the funding for this program would go towards nuclear nonproliferation activities with other nations. How does this work relate to or work with the NNSA's Nuclear Nonproliferation program? Is it redundant, or does the Office of Nuclear Energy bring something different to the table?

Dr. Lyons. The nonproliferation-related work that INEC undertakes is closely coordinated with NNSA's nuclear nonproliferation programs in order to avoid duplication or redundancies. The Nuclear Energy R&D Roadmap specifies that NE will seek to understand and minimize the risks of nuclear proliferation and terrorism. This work includes opportunities to minimize the risks associated with nuclear materials, facilities, sensitive technologies, and expertise through integrated development of new fuel cycle options that are undertaken in the context of the broader nonproliferation and counterterrorism objectives. To memorialize the excellent working relationship that currently exists between NE and NNSA, we have developed a Memorandum of Understanding that establishes a working group to focus on discussing and coordinating technical and policy issues related to R&D efforts in order to optimize and leverage our limited resources.

LEAK AT SAN ONOFRE PLANT

Subcommittee. At the end of January, a leak was identified at the San Onofre plant in Southern California. From what I understand, this did not represent a safety hazard to people living in the vicinity, but I would like to put this in context, and to get insights from both of you into what happened and what we can learn from it.

Chairman Jazcko, can you briefly describe what happened at the plant?

Chairman Jaczko. Unit 3 had been operating for approximately one year following replacement of its two steam generators when, on January 31, 2012, operators received alarms in the control room that indicated reactor coolant was leaking into one of the steam generators (E0-88). The leak was small (less than 100 gallons per day), and the operators responded in accordance with procedures to perform a rapid shutdown. This leak caused a release of radioactive gas to the atmosphere that was well below regulatory limits and did not pose a hazard to onsite workers or the public.

Unit 2, which had both of its steam generators replaced approximately two years ago, had shutdown earlier for a planned refueling outage, and thus was in the process of conducting planned steam generator tube inspections.

There are two steam generators per Unit, and each steam generator has approximately 10,000 tubes. Tests were conducted to evaluate the performance of the steam generator tubes, and to determine if the tubes maintained their design structural integrity during the previous period of operation. Eight of the tubes on steam generator E0-88 in Unit 3 failed the test.

NRC has dispatched an Augmented Inspection Team (AIT), consisting of agency experts in steam generator operation, testing, and manufacturing, to review the design, construction, installation, pre-service inspection, and operation of the steam generators to evaluate the cause of the unexpected wear, as well as any safety concerns with future operation of the steam generators.

Subcommittee. What was the root cause of this incident? Was it a systems design problem, an inspection and monitoring problem, or something else?

Chairman Jaczko. The licensee conducted a review of the issue and determined that one of the possible contributing causes is that the Mitsubishi thermal/hydraulic model under-predicted the behavior of the steam and water in the steam generators. Another possible cause identified is associated with manufacturing differences of the tubes and anti-vibration bars. For Unit 3, the anti-vibration bars do not contact the tubes as tightly as they do on Unit 2, which, along with higher steam/water flows than were predicted, allows the tubes to have induced vibration.

Subcommittee. What is being done to rectify the situation? In a situation like this, what actions does the NRC take?

Chairman Jaczko. The NRC has been inspecting the licensee's testing of the steam generators on both Units 2 and 3 since routine testing began for Unit 2 in late January. Based on the failed pressure tests on the Unit 3 steam generators that were conducted on March 14th, NRC commenced a more comprehensive inspection. Through the AIT and related inspection activities, the NRC will closely follow the licensee's evaluation of the root cause(s) of the steam generator tube wear, and the corrective actions taken. At this time it appears computer models used to predict the behavior of the steam generators did not properly describe the behavior of the steam flow in through the steam generators.

As stated above, the NRC issued a Confirmatory Action Letter to SCE requiring the licensee to determine the cause of the tube-to-tube wear in generators for both Units 2 and 3, remove affected tubes from service, and establish a protocol of inspections and operation limits. SCE must submit the results of their analyses and their plans for inspections and operating limits prior to startup of either unit. The CAL will remain in effect until the NRC has concluded that Units 2 and 3 can be operated safely.

The NRC believes the three follow-up items that could be related to the unexpected tube-to-tube wear are control of design dimensions, thermal/hydraulic model, and 50.59 adequacy. The first two items are associated with the two possible causes identified by the licensee. The NRC is continuing to review the adequacy of the 50.59 evaluation.

Subcommittee. Secretary Lyons, from a technology and systems perspective, what can we learn from this incident? Was this unexpected?

Dr. Lyons. The San Onofre steam generator leak in late January 2012 occurred while the unit was in operation. In accordance with station procedures, the plant operators shutdown Unit 3 in response to the leakage alarms. Steam generator inspections were initiated and confirmed one small leak. Continued inspections of all tubes in both steam generators of Unit 3 identified unexpected wear in 129 tubes. Subsequent pressure testing of the steam generator tubes was begun in March as part of the tube failure investigation. Three additional steam generator tube failures occurred during this testing to date. Additional pressure testing continues and is expected to complete by the end of March. Currently, a Nuclear Regulatory Inspection Team is onsite investigating the tube failures. The root cause of these failures is still under investigation. Preliminary information indicates the cause of the Unit 3 tube failures were the result of tube-to-tube wear and tube wear against internal steam generator structural supports.

This was quite an unexpected event since the steam generators were recently replaced on both Units 2 and 3. Steam generator tube wear was also found during the recent Unit 2 outage steam generator inspections causing a number of tubes to be plugged as a precaution against tube failure. These steam generators were supplied by Mitsubishi Heavy Industries.

The industry and in particular the steam generator vendors will have significant lessons learned from this event when the root cause is finally determined. Utilities should not become complacent because they have new generators installed and remain vigilant about potential issues and failures. In my opinion, the San Onofre operators acted with speed and prudence quickly shutting down Unit 3. Steam generator vendors and utility engineering staffs must ensure all engineering and design aspects of the original equipment suppliers are incorporated into the designs and manufacturing of replacement components.

Subcommittee. What research or other activities can or should the Department do to learn from this situation and further improve reactor safety?

Dr. Lyons. Currently, there is no specific steam generator tube research activity being conducted by DOE. The Electric Power Research Institute (EPRI) has been conducting research and development on steam generator issues, in particular, tube leak issues and tube material degradation, for quite some time as a result of leaks in other nuclear plant steam generators. As such, the Department expects the utility industry and EPRI to focus on the causes of these specific tube failures. On the longer-term, the Department's Light Water Reactor Sustainability program is focused on research activities to enable the existing plants to operate beyond the current license period of 60 years. The Department is coordinating this research with EPRI and is engaged in specific material and component aging and degradation issues. To date, steam generator tube failures has not been a specific topic of the EPRI-coordinated DOE research; however, DOE is evaluating the aging and degradation properties (stress corrosion cracking) of the metal alloys (alloys 600 and 690) that the failed tubes were manufactured from to better understand the causes of basic aging, degradation, and corrosion effects. In the event that the San Onofre steam generator tube failure root cause analysis identifies an alloy 690 material degradation issue that is not the result of a manufacturing or design flaw, the Department will coordinate with EPRI on any specific research required to be performed by DOE's national laboratories.

NUCLEAR WORKFORCE, ELIMINATION OF INTEGRATED UNIVERSITY PROGRAM

Subcommittee. This subcommittee has viewed education and workforce development initiatives proposed across the Department with a critical eye in recent years. Because education and workforce development are the core missions of other federal agencies, the Department must identify a specific workforce need in order to justify a workforce development program.

The Nuclear Energy Integrated University Program is one such program that the Committee has supported. It is necessary because of specific workforce shortfalls identified in the domestic nuclear energy sector. Unfortunately, this year continues the usual dance where the Administration zeroes it out in the budget request.

Secretary Lyons, what is the state of the nation's nuclear energy workforce, as we look forward 2, 5, or 10 years?

Dr. Lyons. The nuclear energy workforce will be in high demand over the next ten years. According to the Nuclear Energy Institute (NEI), the electric power industry alone will have to replace nearly 100,000 skilled workers—more than 25,000 of them in the nuclear industry—by 2015. Many thousands more are near-term retirees with advanced scientific and engineering degrees who perform essential nuclear energy research and security studies at our national laboratories and will also need to be replaced.

In addition, scientists and engineers will be needed to support the projected expansion of nuclear power. It is estimated that U.S. electricity demand will rise over 20 percent by 2035, and simply maintaining nuclear energy's current approximate 20 percent share of this demand would require many new units. NEI projects that each new commercial power plant will require up to 3,500 skilled workers during construction and 400 to 700 operations and maintenance workers in the long-term.

Furthermore, according to a 2010 Energy Policy Institute analysis, the "moderate deployment" projection for commercialization of Small Modular Reactors will result in an additional 200,000 construction and manufacturing jobs and tens of thousands of skilled operations and maintenance jobs to be created by 2030.

Finally, skilled workers will continue to be needed to support a variety of nuclear-related fields, including nuclear non-proliferation, nuclear medicine, global nuclear incident response and analysis, and military applications of nuclear power.

According to data from the Oak Ridge Institute for Science and Education, student enrollment in nuclear engineering undergraduate programs has increased 18% in recent years, providing a positive trend to help address the cumulative demand for future engineers and scientists in the nuclear energy workforce. Department-wide initiatives are underway to help maintain this positive trend in accordance with the Administration's Science, Technology, Engineering and Math education objectives.

Subcommittee. With the American nuclear engineer workforce nearing a time of high retirements and the pipeline of graduating students still not growing sufficiently to fill the spots, why does the Administration propose to eliminate the University Program—especially given our need to keep our reactors safe both now and in the future?

Dr. Lyons. The Department agrees that the Integrated University Program has yielded very good results in support of university-level students studying the nuclear science and engineering fields of study. However, the Department feels that the approach mandated by the Integrated University Program is a less efficient means of advancing the Administration's Science, Technology, Engineering and Math (STEM) education objectives than that which can be achieved by other existing programs. For example, a Department-wide STEM education program has been initiated by the Associate Deputy Secretary of Energy to more effectively address such efforts across all DOE technical programs for more efficient administration and allocation of resources

Also, the Department is confident that expansion of the nuclear industry will create incentives necessary for students to enter nuclear-related programs. For example, the Nuclear Energy Institute recently announced that the nuclear energy industry is providing record funding to institutions of higher education. In 2011, the industry contributed more than $15 million to universities and community colleges to support nuclear engineering programs and nuclear energy technician programs through cash grants, scholarships, fellowships, equipment donations, internships, co-ops and subject matter expert support.

Subcommittee. We have heard that only a small portion of nuclear engineers currently go to work for industry. Given that, why do you believe that industry will fill in financial support in place of these university programs, as stated in the Department of Energy's budget request?

Dr. Lyons. The Department is confident that expansion of the nuclear industry will create incentives necessary for students to enter nuclear-related programs. For example, the Nuclear Energy Institute recently announced that the nuclear energy industry is providing record funding to institutions of higher education. In 2011, the industry contributed more than $15 million to universities and community colleges to support nuclear engineering programs and nuclear energy technician programs through cash grants, scholarships, fellowships, equipment donations, internships, co-ops and subject matter expert support.

According to survey data from the Oak Ridge Institute for Science and Education, 859 nuclear engineering related degrees were awarded in 2010. This total includes bachelors (443), masters (303), and PhD (113) degree recipients. The largest employer for these students was industry, with 178 degree recipients (~21%) joining nuclear utilities, other nuclear-related fields, or other business fields. In comparison, 160 degree recipients (~19%) gained government employment as a Federal employee, DOE Contractor, State and Local Government employee, or the U.S. military. Department-wide initiatives are underway to help maintain this supply of degreed workers for government requirements in accordance with the Administration's Science, Technology, Engineering and Math education objectives.

Subcommittee. How does the lack of this program impact your own recruitment efforts?

Dr. Lyons. The Department does not believe that termination of the Integrated University Program will impact its recruitment efforts in the nuclear science and engineering fields of study because the Department's existing Science, Technology, Engineering and Math (STEM) education programs can effectively fill the need while more efficiently managing the allocation of such resources.

However, to avoid sending a negative and chilling message to aspiring scientists and engineers currently enrolled or entering college, it will be essential that the Department implement an active communications program to effectively engage faculty and students in the nuclear science and engineering fields of study to ensure that they are fully aware of, and able to provide feedback to, Department actions in support of the Administration's STEM education objectives and initiatives. This communications element will be a key component of the Department-wide STEM education program that has been initiated by the Associate Deputy Secretary of Energy to more effectively address such efforts across all DOE technical programs for more efficient administration and allocation of resources.

LIGHT WATER REACTOR SUSTAINABILITY PROGRAM AND LIFE EXTENSION

Subcommittee. Dr. Lyons, the Light Water Reactor Sustainability program has a focus on both further increasing the safety of our operating reactors, and on extending their lifespan. Now, further increasing safety is very important, and that's why we've funded programs across your office to do so. But seeing as how our current reactors produce 20 percent of our electricity, this program's charter for supporting reactor life extensions is as important as ever. The budget request, with its increased focus on fuel safety and its reduction in LWR-S funding by 13 percent, may make this difficult.

Is there room to continue focusing part of this program on research and development supporting life extensions?

Dr. Lyons. The Light Water Reactor Sustainability (LWRS) program is extremely valuable in addressing both the safety and economic issues that could affect how long our existing fleet of nuclear power plants operates. Under an austere budget, we made some very difficult prioritization decisions. To reduce costs, we are maximizing opportunities for cost-share with industry by working very closely with the Electric Power Research Institute (EPRI). Although we would always like to do more, we believe the budget request maintains the necessary research on the most critical issues to support the continued operation of our existing nuclear fleet.

SEISMIC SAFETY AT IDAHO LAB ADVANCED TEST REACTOR

Subcommittee. Dr. Lyons, last year following the events in Japan, there was some concern about seismic safety at the Idaho National Laboratory's Advanced Test Reactor.

What actions has the Department taken to address any concerns, and is that work now complete?

Dr. Lyons. Following the events in Japan, the Department conducted an assessment of the Advanced Test Reactor (ATR), which concluded that ATR has procedures, a rigorous training program, and plant safety equipment that can respond to the most likely Beyond Design Basis Event with a high probability of no release of radioactive material outside the ATR. The Idaho National Laboratory (INL) emergency response organization has procedures and equipment in place to aid ATR in the response to this event, including support from agencies outside the INL.

In conjunction with that effort, the Department and INL reviewed the schedule of previously identified activities that would further enhance the defense-in-depth of the ATR with an emphasis on severe seismic events, and emergency preparedness and response capabilities. These activities included modifying the primary cooling system heat exchanger and pipe supports to provide additional seismic capacity; designing, fabricating, and installing irradiated fuel storage boxes, an emergency water make-up system for the ATR canal, and purchasing portable generators to supply the ATR power to critical systems during a Station Blackout. All activities were in various stages of planning and execution prior to the events in Fukushima, and the Department reallocated additional funds under the fiscal year 2011 continuing resolution to accelerate completion of these activities. All these activities are on schedule to be completed this year.

Subcommittee. Are there any additional funding needs in this year's budget request?

Dr. Lyons. No, there are no additional funding needs to complete the projects listed above.

NEW ADVANCED POST IRRADIATION EXAMINATION CAPABILITIES PROJECT

Subcommittee. Secretary Lyons, the budget request proposes two new infrastructure projects, one of which is the Advanced Post Irradiation Examination Capabilities Project.

What new capabilities would this project provide that are not already available in the United States for nuclear energy research?

Dr. Lyons. Currently, existing U.S. post-irradiation examination (PIE) capabilities are housed in decades-old facilities designed and configured to operate older, first generation PIE instrumentation. Modern, state-of-the-art PIE instrumentation requirements include space, vibration, electrical and magnetic fields, and temperature fluctuation specifications that are difficult to meet in existing facilities.

The Advanced Post-Irradiation Examination (PIE) Capabilities Project would provide a flexible state-of-the-art capability to house the next generation of advanced PIE instrumentation. This capability would handle considerably more sample and examination instrumentation than current U.S. PIE facilities, both in types and quantities. More importantly, the shielded cell design will allow the handling of highly activated fuels and materials. This project would go beyond the current capabilities within the U.S. and the world to provide the capabilities required to conduct in-depth micro- and nano-structure characterization of irradiated fuel and materials and to measure thermal and mechanical properties.

As part of the initial project scoping, two workshops were held to better understand the current capabilities gaps. These workshops, one domestic and one international, validated the national and global needs for PIE to support advanced fuels and nuclear material development.

Subcommittee. What other programs and agencies would benefit from this capability?

Dr. Lyons. In addition to supporting the Department's Light Water Reactor Technology and Fuel Cycle Research and Development missions, advanced PIE capabilities could also support fuel development work for the National Nuclear Security Administration (NNSA), regulatory program activities at the Nuclear Regulatory Commission (NRC), Advanced Test Reactor (ATR) National Scientific User Facility and other research performed by universities, and DOE national laboratories. Other interested parties could include nuclear industry vendors, domestic and foreign regulators, and nuclear generating companies. It may also be used by international partners for the examination of joint collaboration experiments.

REMOTE LOW-LEVEL WASTE DISPOSAL PROJECT AT INL

Subcommittee. The budget request proposes to start construction of the Remote Low-Level Waste Disposal Project at Idaho National Laboratory, a joint project with Naval Reactors whose estimates top out at nearly $100 million. This is quite a large investment but, from what I understand, a necessary replacement for the Radioactive Waste Management Complex, which has been receiving low-level waste since 1952 but closes in 2017.

The request of $6 million in fiscal year 2013 is quite small compared to the investments required in fiscal years 2014 through 2016. How will your budget absorb this ramp-up in costs for this project over the next four years?

Dr. Lyons. This project is a high priority within the Nuclear Energy request, and, as such, lower priority work will be deferred to accommodate the project's funding profile. The funding profile reflected in the proposed project data sheet is at the top of the project definition/conceptual design stage cost range, which was established as $75 million to $95 million. The Department is actively pursuing ways to reduce the overall cost of the project, such as competing the construction of this facility as a firm fixed price activity. Once the project baseline is established, which occurs at the completion of preliminary design, the project funding profile will be adjusted to reflect the project cost.

Subcommittee. With the Radioactive Waste Management Complex closing in 2017 and this replacement project slated to be done in 2017, there does not appear to be much room for error. How much flexibility does the Lab have in closing the current Waste Complex in 2017?

Dr. Lyons. Closure of the subsurface disposal area of the RWMC is dependent on the waste generation rates of on-site users and the availability of funding for closure activities performed by the Office of Environmental Management. Initially, the facility was projected to close in 2015 but was revised to late 2017/early 2018, based on current waste generation rates. The Department closely monitors waste projections in conjunction with the RHLLW Disposal Project schedule to minimize any potential impacts.

Subcommittee. What happens if construction is delayed and this facility cannot open until 2018 or later?

Dr. Lyons. The Department has identified options should the RHLLW Disposal Project be delayed beyond 2017. NE-generated RHLLW can be disposed of at an off-site location and NR has approximately 1 year of on-site RHLLW storage capacity.

Subcommittee. What portion of this project will be funded by the Office of Nuclear Energy, and what portion will be funded by the Naval Reactors Program?

Dr. Lyons. The Office of Nuclear Energy (NE) and the Office of Naval Reactors (NR) signed a Memorandum of Agreement in 2009 that defined the cost sharing arrangement for the RH LLW Disposal Project. Funding shares are based on the percentage of NE and NR contributions to the total volume of RH LLW projected to be disposed of in the facility. Based on the projected waste disposal volumes in 2009, NR is contributing 52%, and NE 48% of the project cost.

ADVANCED TEST REACTOR AT IDAHO NATIONAL LAB

Subcommittee. Secretary Lyons, while the budget request provides generally strong funding for important infrastructure and facilities management at the Idaho National Lab, it does not provide funding for any investments in the Advanced Test Reactor (ATR).

Funding has been devoted in the last several years to seismic improvements at the ATR. What is the status of that work?

Dr. Lyons. Within the Idaho Facilities Management (IFM) program, the Advanced Test Reactor (ATR) Life Extension Program (LEP), initiated in fiscal year 2006, provides funds to modernize systems and capabilities within the ATR. Since the start of the LEP, over $114 million has been invested in ATR on activities such as replacing the ATR Distributed Control System/Console Display System and various nuclear instruments to improve ATR reliability. Additionally, IFM supports the ATR Core Internals Change-out efforts, which fully replaces limited-life ATR components to ensure in core components can sustain continued operations.

Through the ATR LEP, seismic improvements were identified and funded to enhance the defense-in-depth at the ATR. Additional funds were provided in fiscal year 2011 to accelerate the completion of identified improvements, including improvements to seismic supports and bracings for the ATR primary cooling system. This work is ongoing and planned for completion in 2012.

Subcommittee. There is still work to be done to improve infrastructure at the ATR — coolant pumps, water tanks, and confinement improvements — but these are not funded in the request. Are any of these improvements critical in the near future?

Dr. Lyons. The Department and INL are developing a long-term sustainment program to ensure ATR is available to meet current and future missions. As part of this sustainment program, initial planning efforts are underway to identify activities that would refurbish the ATR such that it would more closely match commercial reactor standards. While still in the initial planning phases, the following options are being explored:

- Replacing the current electrical distribution system and emergency back-up power system at the ATR Complex and providing redundant, 100% commercial power with split buses each with Uninterruptable Power Supplies and backup emergency diesel generators. This will eliminate the need to continuously run diesel generators, which would significantly reduce greenhouse gas emissions for the site, and relocate power switches external to the ATR reactor building.

- Replacing the Emergency Firewater Injection System with a new system that utilizes reactor-grade water, preventing damage of the ATR in case of an inadvertent actuation. Currently, the ATR relies on raw-well water system to provide water in the event of any loss-of-coolant accident, which would damage the reactor internals beyond repair (such as what was seen in Fukushima when sea water was utilized). In addition to provide reactor-grade water, the system would provide the ability to recirculate coolant to remove heat and a new water storage tank.

- Replacement of the ATR Primary Coolant Pumps to improve reliability and efficiency of the ATR through lower maintenance and repair cost.

- Constructing a remote access control room for the ATR to provide the capability to monitor and manage the reactor outside of the ATR building in the event that the reactor control room or the reactor building becomes inhabitable. The remote access control room will minimize the radiation exposure to reactor operations and emergency response personnel, and will provide the remote capability to monitor and mitigate accident conditions in the event that control room operators are unable to leave the ATR in a safe shutdown condition.

In addition to these near-term activities, the Department is assessing long-term sustainment need (beyond 15 years) to assure ATR operation; however, there is no decision at this time to pursue these activities.

Subcommittee. In what timeframe do these improvements need to be completed?

Dr. Lyons. The activities identified above are enhancements to the current ATR systems and not safety-related activities. While no specific timeframes are established, the Department is assessing the feasibility of this work within the next 10-15 year planning window.

LITHIUM-7 ISOTOPE PRODUCTION

Subcommittee. Secretary Lyons, I understand that the Office of Science has assumed responsibility for the Department's civilian isotope production activities, but I'd still like you one question in this area, as it relates to nuclear energy.

Russia and China are currently the only major sources of Lithium-7, which is important to some nuclear power reactor operations. As more nuclear power plants are constructed throughout the world, the demand for Lithium-7 will likely increase.

How is the Department positioning itself to respond to a potential future shortage of Lithium-7 and/or other isotopes? How are you working with the Office of Science to identify the severity of this issue, and to make sure it is addressed?

Dr. Lyons. The Department has taken many steps to better understand isotope demand in order to prepare for and possibly mitigate potential shortages. Most recently, the Office of Science and NNSA organized a Federal Workshop on Isotope Demand and Supply in January 2012 in which over twenty different federal entities participated and identified isotopes that were critically needed in order to meet their mission, including outyear projections and estimates of quantities needed. In August 2011, the Office of Science participated in a Stable Isotope Workshop sponsored by DOE in which the status of nuclear energy-related critical isotopes (lithium-7, boron-10, and depleted zinc) was assessed. Near- and long-term supply and demand projections and production technologies were discussed. The Office of Science is currently engaged with federal entities including the Office of Nuclear Energy, industrial stakeholders, and others to understand demand, any potential supply challenges, and whether there is an appropriate role for the Department to play in mitigating any potential lithium-7 shortages. DOE recognizes the importance of these critical isotopes to U.S. energy production and the need to assure a reliable supply for our Nation.

NUCLEAR REGULATORY COMMISSION

EMERGENCY POWERS

Subcommittee. Mr. Chairman, last year while the events at the Fukushima plant was unfolding, you invoked emergency authority and continued to operate under that authority for quite some time. Many members believe that your use of this authority was unjustified and was well beyond what the Congress intended when it granted that authority years ago.

First, are you still operating under emergency authority?

For how long did you operate under emergency authority? When did you begin using it, and when did you cease using the authority?

Chairman Jaczko. Starting on March 11, 2011, and lasting until May 16, 2011, the NRC's headquarters operations center was in monitoring mode in response to an emergency situation resulting from the March 11, 2011 earthquake and tsunami in Japan. Under Section 3 of Reorganization Plan No. 1 of 1980, the Chairman has authority for emergency response at the NRC.

Subcommittee. The law granting you emergency authority makes clear that it is intended to be used only when there is imminent danger here at home. How did you legally justify invoking this authority during events on the other side of the globe?

Chairman Jaczko. I consulted the NRC's General Counsel throughout the agency's response to events in Japan to ensure that all actions taken were in accordance with existing law and my authorities.

Subcommittee. What was the practical impact of using emergency authority? Did it allow you to direct the NRC to take actions without a vote by the Commission? Did it allow you to take other actions you can't normally take?

Chairman Jaczko. In the context of events in Japan, the General Counsel advised that my actions fell within my usual responsibilities as the NRC's principal executive officer and official spokesperson for the Commission under Section 2 of the Reorganization Plan. Therefore, I did not take any actions that, under normal circumstances, would have required a Commission vote, or would have otherwise been beyond my legal authority.

Subcommittee. Couldn't you have taken the same actions with the vote of the full Commission, which would have built support for the NRC's actions during this trying time?

Please provide for the record a comprehensive list of each decision you took under emergency authority that would have normally required the action of the full Commission.

Chairman Jaczko. No. Most of the actions I took were outside the authority of the Commission but I made every effort to keep them informed of my actions and the actions of the agency. In addition, the Commission did – in a unanimous vote – establish the Near-Term Task Force within days of the events to conduct a systematic and methodical review of U.S. Nuclear Regulatory Commission processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy direction, in light of the accident at the Fukushima Dai-ichi Nuclear Power Plant.

OVERSIGHT OF FIRST NEW REACTOR CONSTRUCTION IN 34 YEARS

Subcommittee. Mr. Chairman, with the NRC's approval of construction of new reactors at the Vogtle plant, the NRC will transition from review of the license application to oversight of construction. Now, the NRC has not overseen construction of a reactor for quite some time.

What do you believe will be the main challenges for the NRC while it transitions for the first time in many years to oversight of a large construction project?

Chairman Jaczko. In anticipation or new reactor construction activities, over the past four years the NRC has updated its existing construction inspection procedures, and increased construction inspector training. Although the construction inspection process has been in place for decades, the concept of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) and their incorporation into the license are being implemented for the first time under the 10 CFR Part 52 Combined licensing requirements. The challenge we see at this time is associated with ITAAC closure, which is necessary to authorize fuel load in accordance with 10 CFR 52.103(g). The staff has been working with licensees and public stakeholders to develop the processes and procedures to verify that ITAAC are met. As construction begins and the process for closing ITAAC is exercised, the processes and procedures will be refined to incorporate lessons learned. Although this will present some challenges, we have current experience overseeing construction of new nuclear facilities including LES, Watts Bar 2, Browns Ferry restart. Further we are gaining knowledge from other countries as they construct new reactors.

Subcommittee. Does the Commission have what it needs to oversee construction at this plant and at any additional sites that may be approved in the near future?

Chairman Jaczko. Yes. The NRC has developed a revised inspection program and put in place the structure and procedures required to implement the new reactor construction oversight program for ongoing and near-term construction activities. This new inspection program (1) incorporates key elements in 10 CFR Part 52, such as ITAAC; (2) incorporates lessons learned from the inspection program used in the previous construction era for plants licensed under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities;" as well as more recent fuel facilities licensed under 10 CFR Part 70, and (3) considers modular construction at remote locations. The Commission approved a construction assessment program that includes a regulatory framework, use of a construction significance determination process, and adoption of a construction action matrix similar to the reactor oversight process.

Subcommittee. Does the NRC have the type of staff — with the type of experience — necessary to do this oversight?

Chairman Jaczko. Yes. The NRC has been hiring and training staff to implement the construction oversight program for the last four years. A construction inspector training program is in place to train and qualify personnel to perform inspections necessary to confirm compliance with regulations. The Region II Center for Construction Inspection and the Office of New Reactors vendor branches are currently staffed with a sufficient number of trained and qualified inspectors to support the currently anticipated inspections. Additionally, the construction inspection program was created using experienced staff that were involved in the previous construction era.

Subcommittee. Does the budget request reflect any shifts necessary to make this transition from review to oversight?

Chairman Jaczko. Yes. The NRC has been preparing and budgeting for an adequate level of resources to implement the construction oversight program at the planned construction sites. The NRC FY2012 and proposed FY2013 budgets include adequate resources for the oversight of construction activities. The Commission will continue to work ensure adequate resource allocations for construction oversight activities.

NRC SMALL MODULAR REACTOR LICENSING PROGRAM

Subcommittee. Chairman Jaczko, the Department of Energy has received initial funding in the current fiscal year for the new Small Modular Reactor licensing program. As this program provides financial support for two reactor designs going through first-of-a-kind engineering and the NRC licensing process, this program will inevitably involve the NRC.

Mr. Chairman, what has the NRC done so far as preparation for SMR licensing, and what has the NRC done to effectively work with the Department of Energy in this program?

Chairman Jaczko. The NRC staff has undertaken a variety of activities to prepare for applications for SMRs that may arrive as early as calendar year 2013. The NRC staff has evaluated past advanced reactor experience and interacted with stakeholders to identify key policy issues that should be addressed to support design and licensing reviews of SMR designs and deployment. The NRC staff has focused its attention on the Next Generation Nuclear Plant (NGNP) program and on integral pressurized-water reactors (iPWRs). The staff is engaged in pre-application interactions with some iPWR vendors and is currently developing technical review standards that are specific to the design of those SMRs. These standards are part of a review approach that utilizes staff experience and insights from the individual vendor's probabilistic risk assessment to focus the review on those features of a design that most greatly impact safety. The NRC has identified potential key policy issues and is developing strategies to resolve these potential key policy issues for SMR licensing. These issues include licensing fees, control room staffing, emergency planning, and security.

Subcommittee. Is sufficient funding for these new activities reflected in the budget request?

Chairman Jaczko. Yes. The NRC has budgeted resources to support those SMR activities that appear likely to be the first submitted to us with applications, based on NRC's assessment of the vendors' stated plans and the maturity of their programs.

Subcommittee. What do you foresee as the largest challenges for the NRC in through an SMR licensing process?

Chairman Jaczko. The largest challenges for the NRC stem from (1) the continuing uncertainty and shifting schedules from the potential SMR applicants, and (2) uncertainty associated with the specific technologies to be selected by DOE under its SMR program. NRC has made good progress on the key policy issues identified by both the staff and industry, and we expect the licensing infrastructure for the iPWRs will be fully developed and in place prior to the first application. The efficiency and duration of the reviews will depend heavily on the industry submitting complete and high quality applications. Were a design other than the iPWR to be selected for support by DOE, any review would necessarily be less efficient and take longer than for the iPWRs where the infrastructure is being put in place.

Subcommittee. Do you have any concerns about the program?

Chairman Jaczko. The NRC is closely coordinating its SMR program with the DOE program. The rapidly changing nature of the SMR segment of the nuclear industry is creating considerable uncertainty in how the licensing needs will unfold in the future. A more coordinated approach to support development and deployment would benefit the developers, the industry, the regulators, and the public.

PUTTING RECENT ISSUES AT OPERATING PLANTS IN CONTEXT

Subcommittee. Chairman Jaczko — and Secretary Lyons, if you care to comment on this as well — we have had some issues with our operating reactors over the past year, including some pipe leaks and some reactors affected by flooding events.

It seems like we've seen quite a few such headlines recently. Has there been an increase in the rate at which these incidents are happening?

Chairman Jaczko. Based on NRC's Industry Trends Program indicators and the Accident Sequence Precursor Program results, we have seen some increase in the rate of these incidents. However, we have not identified any statistically significant adverse long-term trends in industry safety performance through the end of 2011.

The staff's analysis also did not reveal any emerging year-to-year trends that warranted additional analysis or significant adjustments to the nuclear reactor safety inspection or licensing programs.

Subcommittee. Have any of these incidents been of particular cause for concern, or posed any risk to people in the surrounding areas?

Which of the occurrences in the last year are of particular concern to you, and what are you doing to address those concerns? For instance, is the Department of Energy helping to lend its expertise to addressing highly technical issues as they arise?

Chairman Jaczko. One way we gauge incidents of concern is through the agency's "Abnormal Occurrence" (AO) report. Consistent with Federal law, the NRC defines an AO as an unscheduled incident or event that the NRC determines to be significant from the standpoint of public health or safety. The draft 2011 AO report contains one operating reactor event meeting the criteria for reporting. This event occurred at the Browns Ferry Nuclear Plant, Unit 1. This plant discovered a failed injection valve in the low pressure coolant injection system. This valve failure would have prevented the residual heat removal system from performing its safe shutdown function in an emergency. The NRC's significance determination process assigned this occurrence an inspection finding of high safety significance (Red finding). Browns Ferry is currently receiving increased

NRC oversight for multiple/repetitive degraded cornerstones under the Reactor Oversight Process.

An event that did not meet any AO criteria, but that is of concern to NRC, involves the high river level in the Missouri River that occurred in the spring and summer of 2011 and affected Fort Calhoun Station. This situation followed NRC's issuance of a finding of substantial safety significance (Yellow finding) related to deficiencies in the licensee's flooding coping strategies that were identified during a 2009 inspection. By identifying and having the licensee address this issue prior to the flooding that occurred, the NRC enhanced the safety of the site. NRC staff continues to evaluate other plant performance issues at Fort Calhoun, including a fire that occurred on June 7, 2011. Fort Calhoun Station has been in an extended plant shutdown since April 2011, and on December 13, 2011, NRC made the decision to transition the plant's oversight to that defined in Inspection Manual Chapter 0350, "Oversight of Reactor Facilities in a Shutdown Condition due to Significant Performance and/or Operational Concerns."

In addition to events such as those mentioned above, the NRC evaluates industry operating experience on a continuing basis, and follows up on issues of concern at lower thresholds than those mentioned in above. Two recent examples include the January 2012 steam generator tube leaks at the San Onofre Nuclear Generating Station, and the August 2011 earthquake that affected the North Anna Nuclear Station. In both of these cases, the NRC dispatched inspection teams to provide increased regulatory oversight in accordance with the Reactor Oversight Process.

NRC staff maintains open communications and cooperative relationships with our federal agency partners, including DOE, requesting their assistance when warranted. The NRC has received strong support in return. Regarding highly technical issues, the NRC regularly accesses the expertise of DOE's national laboratories.

Subcommittee. Chairman Jaczko, the events at Fukushima in Japan last March gave us cause to look broadly into safeguards at our operating nuclear plants, and more specifically at safeguards against the natural events and circumstances that occurred at Fukushima.

Let's consider earthquakes. What is the current finding by the NRC after reviewing the seismic safety of our current reactors? Will any NRC actions lead to increased protection against seismic events or change the review process moving forward?

Chairman Jaczko. Although the NRC currently believes the continued operation and licensing activities for the current reactor fleet do not pose an imminent risk to public health and safety, NRC will continue to ensure that issues impacting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their safety significance.

Prior to the March 11, 2011, event in Japan, the NRC began reviewing the potential for seismic events beyond the plants' design bases. As part of the Individual Plant Examination of External Events (IPEEE) effort in the 1990s, the staff determined that operating nuclear plants in the U.S. had adequate safety margins for withstanding earthquakes. However, following publication of the preliminary results from work by the United States Geological Survey in 2004, when NRC was reviewing several early site permit applications, the NRC recognized that the probability of exceeding the safe shutdown earthquake at some of the currently operating sites in the Central and Eastern U.S. was higher than previously understood. In June 2005, the NRC added Generic Issue (GI)-199, "Implications of Updated Probabilistic Seismic Estimates in Central and Eastern United States on Existing Plants," to its Generic Issues Program. In the fall of 2008, the NRC concluded that GI-199 should proceed to the safety / risk assessment stage of the Generic Issues Program. The NRC presented the safety/risk assessment results at a public meeting on October 6, 2010. At that time, the NRC concluded that for some plants the seismic risk had increased, although, an immediate safety concern did not exist and adequate protection of public health and safety was not challenged as a result of the new seismic hazard information.

The NRC's Near-Term Task Force (NTTF) recommended that NRC require licensees to reevaluate and upgrade as necessary the design-basis seismic and flooding protection of structures, systems, and components for each operating reactor. On March 12, 2012, the NRC sent letters to all power reactor licensees and holders of construction permits requesting information that NRC needs in order to determine whether additional regulatory action will be needed to ensure seismic safety at these plants. The efforts that the NRC had previously initiated on GI-199 were subsumed by the process described in the NRC's March 12, 2012, request for information.

Subcommittee. We understand that flooding is a significant concern. Can you explain to the Subcommittee why that is so, and what the NRC is doing to address its concerns?

Chairman Jaczko. One of the unique concerns with flooding is the "cliff-edge" effect, in which the safety consequences of a flooding event may increase sharply with a small increase in the flooding level (e.g., a small increase in flooding level that goes above a protective barrier wall). In its March 12, 2012, request for information, the NRC asked licensees to perform walk-downs to look for these potential "cliff-edge" effects and to evaluate whether follow up action is needed. Additionally, the NRC inspection staff will monitor the walk-downs that the licensees will perform to collect this information. The request for information also requests that licensees reevaluate flood hazards at their plants and provide information that the NRC needs in order to determine whether additional regulatory action will be needed to ensure safety.

In February 2012, the NRC also approved the establishment of Generic Issue-204, "Flooding of Nuclear Power Plant Sites Following Upstream Dam Failure." The evaluation of generic dam failure frequencies from this effort, coupled with an assessment of the characteristics of dams upstream of commercial nuclear reactor sites, does not indicate a likelihood of failure requiring immediate mitigating action at nuclear power plants. However, new information suggests that flooding effects, in some cases, may be greater than previously expected. The NRC's March 12, 2012, letter to its licensees also requested the information that the agency needs to determine whether additional regulatory action will be needed to address upstream dam failures at these plants.

Subcommittee. When will we know if any operating plants will need to make modifications for seismicity and flooding, based on the reviews following Fukushima?

Chairman Jaczko. The NRC staff will determine if plant modifications are needed using a two-phased approach.

The first phase was initiated by the NRC's March 12, 2012, request for information which requires that licensees reevaluate the seismic and flooding hazards at their sites using updated seismic and flooding hazard information and present-day regulatory guidance and methodologies, complete walk-downs of their sites, and if necessary, perform a risk evaluation or integrated assessment of the results. These actions will identify the existence of degraded, or non-conforming conditions, and cliff-edge effects for flooding so that they are addressed by the licensee's corrective action program and will provide input to the hazard reevaluation.

Based on the licensees' responses, the NRC will determine in the second phase whether additional regulatory actions are necessary (e.g., update the design bases and systems, structures, and components important to safety) to protect against the updated hazards.

Seismic evaluations performed under the first phase will be completed between October 2016 and April 2019, depending on the priority of the site, and flooding assessments performed during the first phase will be completed between March 2013 and March 2017, depending on the priority of the site.

Looking ahead, the Near Term Task Force also recommended that the NRC initiate rulemaking to require licensees to confirm seismic hazards and flooding hazards every 10 years and address any new and significant information and, if necessary, update the design bases for systems, structures, and components important to safety to protect against the updated hazards. The staff will evaluate what action to take on this recommendation based, in part, on the results of the initial reevaluations discussed above.

Subcommittee. In what other major areas is the NRC considering to recommend or require improvements in the near- and long-term? What should we expect to see up next?

Chairman Jaczko. The NTTF documented its 12 proposed recommendations in its report issued in July, 2011. The Commission subsequently adopted and prioritized action on those recommendations into three tiers.

Tier 1 recommendations are those Task Force recommendations the staff determined could be implemented without unnecessary delay and for which sufficient resources are available. Tier 2 includes recommendations that cannot be initiated in the near term due to factors that include the need for further technical assessment and alignment, dependence on Tier 1 issues, or availability of critical skill sets. Tier 3 recommendations are those that require further staff study, or are dependent on completion of an associated short-term action.

Consistent with Tier 1 prioritization, on March 12, 2012, the NRC issued three Orders to licensees, as part of implementing recommendations related to the events in Japan. Two of the Orders apply to all U.S. power reactor licensees, and holders of construction permits in active or deferred status. The first Order requires the plants to better protect safety equipment installed after the 9/11 terrorist attacks and to obtain sufficient equipment to support all reactors at a given site simultaneously. The second Order requires the plants to install enhanced equipment for monitoring water levels in each plant's spent fuel pool.

The third Order applies only to U.S. boiling-water reactors that have "Mark I" or "Mark II" containment structures. These reactors must improve venting systems (or for the Mark II plants, install new systems) that help prevent or mitigate core damage in the event of a serious accident. Plants have until Dec. 31, 2016, to complete modifications and meet the requirements of all three Orders.

The NRC also issued a detailed information request to every operating U.S. commercial nuclear power plant, and certain parts will apply to reactors currently under construction or recently licensed. The request covers several topics, including:

- Re-analyzing earthquake and flooding risks using the latest available information;

- Conducting earthquake and flooding hazard "walk-downs," where skilled engineers closely examine a plant's ability to meet current requirements;
- Assessing the ability of a plant's current communications systems and equipment to perform under conditions of onsite and offsite damage and prolonged loss of all alternating current (ac) electrical power; and
- Assessing plant staffing levels needed to fill emergency positions in response to events simultaneously affecting all reactors at a given site.
- Each section of the request includes schedules for plants to provide the relevant information to the NRC.

Staff will submit three policy papers to the Commission in July 2012: (1) will propose a timeline and resource needs for the recommendations in the Near-Term Task Force Report, (2) will discuss issues related to installing filters on hardened vents and (3) will discuss the potential for land contamination.

FUKUSHIMA: TIMELINE FOR FUKUSHIMA SEISMIC REQUIREMENTS

Subcommittee. Chairman Jaczko, I'd like to spend a moment on seismic requirements coming out of the Fukushima task force recommendations. In the near-term, the Japan Task Force recommended seismic reevaluations of all plants, and a "seismic walkdown" by each operator — meaning, each plant identifies any changes it must make to address any new seismic concerns.

What timeline is the NRC using for each of the major steps for these seismic requirements?

Chairman Jaczko. On March 12, 2012, the NRC issued a request for information to have all operating nuclear power plants perform seismic walkdowns using the NRC-endorsed walkdown methodology, as well as reevaluate the seismic hazards at their sites using present-day methods, and as appropriate, assess the significance of this new hazard to the safe operation of the reactor and spent fuel pool. All licensees are to develop their seismic walkdown procedures by July 2012, and complete walkdowns of their plants by March 2013. The established schedules for completing the seismic reevaluation are based on a two phase approach.

In the first phase, licensees will reanalyze the seismic hazard for their facilities based on the best available information. In short, the licensee will use present-day methods and updated geographical data to determine if an earthquake of greater magnitude than originally designed for is reasonable possible at its site. The established schedule calls for this phase to be completed within three years for all U.S. plant sites. Specifically, plant sites in the central and eastern United States (CEUS) (i.e., plant sites east of the Rocky Mountains) are expected to complete their seismic hazard reanalysis by September 2013, while plant sites in the western United States (WUS) are expected to complete their reanalysis by March 2015. The schedule differences in this phase reflect the availability of recently completed geographical seismic studies for the CEUS. Western plants need additional time to develop similar information in order to complete this phase.

If a licensee identifies an increased seismic hazard based upon the reanalysis performed in the first phase of this process, the second phase requires it to reevaluate the significance of that increased seismic hazard to its facility.

This will require detailed engineering and risk analyses to be completed on key safety equipment and plant structures. The current schedule calls for this phase of the reevaluation to be completed by October 2017 for facilities in the CEUS, and by April 2019 for facilities in the WUS. These dates represent the latest acceptable date for licensees to complete the analyses; however, the NRC staff, as directed by the Commission, is looking for ways to expedite this time frame in order to meet the Commission's five year goal. Based upon the outcome of this phase of the reevaluation, the licensee is expected to identify any necessary changes to its facility to ensure protection against its updated seismic hazard.

Stage	Geographic Area			
	CEUS		WUS	
Complete hazard reevaluation	September 2013		March 2015	
Complete risk evaluation	October 2016 (high priority)	October 2017 (low priority)	April 2018 (high priority)	April 2019 (low priority)

Subcommittee. Have you discussed this timeline with nuclear plant operators?

Chairman Jaczko. The NRC staff continues to meet regularly with a variety of stakeholders, including nuclear plant operators, in public meetings to discuss the seismic reevaluation and walk-down plans. Industry and utility representatives have been actively participating in these public meetings.

Subcommittee. How have you taken into account the workforce available to nuclear plant operators when coming up with the timeline?

Chairman Jaczko. Based on feedback from stakeholders, the NRC is working to develop an appropriate screening and prioritization protocol to ensure that the resources available for performing this type of work will be used efficiently and that nuclear safety will be assured.

Subcommittee. Are there concerns about how quickly the NRC wants them to act, and what are you doing to address their concerns?

Chairman Jaczko. We are aware of industry concerns regarding the time and effort required to complete a seismic risk evaluation. We are confident in our approach and will continue to look for ways that will allow us to meet the Commission's 5-year implementation goal.

FUKUSHIMA LESSONS LEARNED ABOUT SPENT FUEL POOLS

Subcommittee. Chairman Jaczko, at this time last year, there was considerable confusion and unknowns about the state of the spent fuel pools at the Fukushima Dai'ichi reactors in Japan. One primary fear was that the water level in those pools was dropping below the fuel rods. Since then, I believe we've learned quite a lot about what actually happened.

Can you summarize what we've learned about the performance and safety of the spent fuel pools at Fukushima? Was there a safety issue at the pools?

Chairman Jaczko. The Japanese government confirmed that the spent fuel pool structures maintained the capability to safely store spent fuel in pools at Fukushima Dai-ichi despite experiencing earthquake accelerations slightly exceeding the facility design basis and, at several units, hydrogen explosions that severely damaged upper exterior walls of the reactor building. With no leakage, the pools retained sufficient water to cool the stored fuel until adequate water to recover from evaporative losses was provided, beginning about 9 days after the earthquake. However, the lack of instrumentation to confirm spent fuel pool water inventory and the March 15, 2011, hydrogen explosion in the Unit 4 reactor building created uncertainty regarding the status of fuel in the spent fuel pools.

In Unit 4, all fuel had been transferred from the reactor vessel to the spent fuel pool prior to the earthquake. Therefore, the hydrogen explosion, steam releases, and elevated radiation levels suggested possible overheating of the fuel in the Unit 4 pool. This possibility caused the Japanese government to direct action to add water to the spent fuel pools, including deployment of government resources for water addition. These resources succeeded in adding water to the Unit 3 and 4 spent fuel pools with external sprays, and the on-site personnel noted a concurrent decrease in the radiation levels around the units, possibly from improved shielding. However, subsequent testing and visual surveys demonstrated that the stored fuel was relatively undamaged and the Unit 3 reactor was the likely source of the hydrogen that detonated in the Unit 4 reactor building.

Overall, the pools provided for the safe storage of the fuel in the reactor buildings at Fukushima Dai-ichi. However, addition of water and structural reinforcements were necessary to maintain safe fuel storage conditions and the lack of instrumentation prevented the prompt diagnosis of pool conditions.

Subcommittee. How has the NRC taken actions based on our current knowledge about what happened in the pools?

Chairman Jaczko. Immediately following the events in Japan, the NRC directed its inspectors at all nuclear power plants sites to confirm the reliability of licensees' strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire. There were no significant safety issues identified and these inspections were completed on April 15, 2011.

Since then, the Near-Term Task Force recommendations were proposed to the Commission, including a number related to spent fuel pools. The Commission directed a senior management staff steering committee to review and prioritize a number of these recommendations for action.

The Commission approved the staff's recommendations to issue orders to each of the operating nuclear power plants, construction permit holders, and combined license holders in the United States, requiring licensees to provide reliable spent fuel pool indication with the following features:

- **Instruments** – two level instruments; one installed, and one either installed or portable
- **Range** – normal spent fuel pool level to the top of the fuel racks
- **Power** – independent power supplies with the capability for portable back-up power supply
- **Protection** – similar seismic design to the spent fuel pool, arranged to maximize debris protection
- **Qualification** – able to withstand temperature, humidity, and radiation accident conditions.

In addition, this Order requires licensees, including new reactor licensees, to develop strategies to maintain or restore spent fuel pool cooling capabilities following a beyond-design-basis external event. The equipment associated with these capabilities must be protected from external events. Compliance with the orders must be completed by December 30, 2016 or earlier.

Subcommittee. Dr. Lyons, given our knowledge of what happened in the pools at Fukushima, what research activities at the Department regarding spent fuel pools — if any — are warranted?

Subcommittee. Some have suggested last year that fuel should be removed as quickly as possible from spent fuel pools. Has the NRC found any merit in this suggestion?

Chairman Jaczko. The NRC believes spent fuel pools and dry casks both provide adequate protection of public health and safety and the environment.

Recognizing increased interest in spent fuel pool safety, the NRC initiated a Spent Fuel Pool Scoping Study. Headed by our Office of Nuclear Regulatory Research, this study is evaluating the effect on accident consequences when a reduced amount of spent nuclear fuel is stored in the spent fuel pool (by removing older fuel in an expedited manner and placing it in dry storage). The intent of this study is to provide updated consequence estimates for a particular scenario of interest. We expect to release the results from this study for public review and comment later this year. We recognize that there are numerous regulatory and technical details to consider when moving spent fuel to dry cask storage, and plan to fully explore all issues to ensure the continued safety of spent fuel storage.

FUKUSHIMA LESSONS LEARNED ABOUT NRC EMERGENCY PROCESS

Subcommittee. Chairman Jaczko and Secretary Lyons, both of your agencies were quite involved as the events at the Fukushima Dai'ichi plant unfolded in March last year. Your agencies assisted Japan, made recommendations to Americans overseas, and helped to facilitate accurate communication of the events to the American public.

Clearly, Mr. Chairman, we are interested in the task force recommendations and subsequent changed in NRC regulations. But I'm sure you have also looked back your organization's reaction as the events unfolded, in order to improve your emergency preparedness moving forward.

Chairman Jaczko, what were some of the most challenging aspects of the NRC's role last March?

Chairman Jaczko. Shortly after the earthquake and tsunami in Japan, the NRC's Emergency Operations Center went into an around-the-clock monitoring mode, with our first concern being the potential for a tsunami to affect U.S. plants and radioactive materials on the west coast, and in Hawaii, Alaska, and the U.S. territories in the Pacific. When the potential threat of a tsunami on NRC-licensed facilities had passed, NRC's focus turned towards providing advice to the U.S. Embassy related to the safety of U.S. citizens in Japan and assistance to the Japanese.

One of the most challenging aspects of the early phase of our response was that, unlike our expectation for an event at a U.S. nuclear facility, the NRC had relatively little access to information on the plant design or post-event status. This made it difficult to assess plant conditions and offer time-critical advice to the U.S. ambassador. Our agency's response program was flexible enough to provide highly effective support to the U.S. government's overall response efforts. Nevertheless, we expect that more clearly defining lead and supporting agencies for future international response efforts would increase the effectiveness of communications and coordination. Our staff is actively participating in interagency efforts to address these issues.

Subcommittee. What were some of the lessons learned from that experience about how to quickly respond to similar situations in the future?

Chairman Jaczko. NRC has carefully reviewed its Fukushima experience with a view towards responding to similar situations in the future. A thorough review was performed, and the results are documented in a comprehensive, publicly available After Action Report (AAR). The NRC is currently working to strengthen the agency's internal incident response processes and procedures to address issues documented in the AAR, such as tracking and prioritizing tasks, assuring continuity during leadership and personnel shifts, training volunteers to support a protracted event, and accessing subject matter experts.

Subcommittee. Secretary Lyons, you and your team were also involved as the events in Fukushima unfolded. Did you and your organization learn anything about your readiness during the process?

Subcommittee. What did you both learn about how the NRC and the Department of Energy can work together moving forward?

Chairman Jaczko. The NRC and Department of Energy (DOE) already work together closely and are well prepared to respond to a domestic nuclear or radiological event. In addition to established protocols for communications and information sharing, the two organizations coordinate closely in the utilization of certain DOE response assets, including the Federal Radiological Monitoring and Assessment Center (FRMC), and the National Atmosphere Release Analysis Center (NARAC).

CARRYOVER FUNDS

Subcommittee. Chairman Jaczko, in the past, the NRC has carried over significant funding from year to year.

What is the estimate of your carryover funds for fiscal year 2012?

Do you think this amount is appropriate? If not, what are you doing to "spend down" the funding to an appropriate level?

Can we expect to see a reprogramming?

Chairman Jaczko. Managing the agency's carryover has been a priority area for me since I was appointed Chairman. Over the past two fiscal years, NRC has reduced unobligated fee-based carryover from approximately 6% to just over 2 % of new budget authority. This has been accomplished by aggressively managing agency contracts to obligate funds and seeking early reprogramming of prior year funds recovered from completed contracts. At the end of FY 2011 NRC unobligated carryover was $32M. During FY 2012, NRC experienced a significant reduction in licensing workload as the nuclear industry redirected its resources in response to the Japan nuclear event. As a result NRC has sufficient current year funds to meet its emergent needs and will not request a reprogramming in FY 2012. It is expected that NRC unobligated carryover funds will increase from its FY 2011 amounts due to agency operations and recovery of prior year funds from completed contracts. These funds will be available in FY 2013 to meet NRC needs.

NUCLEAR WASTE MANAGEMENT

LONG-TERM NUCLEAR WASTE STORAGE STRATEGY

Subcommittee. In March 2011, the GAO reported that terminating the Yucca Mountain repository would not affect operations on DOE sites in the near term but would likely extend on-site storage and increase storage costs, which could be substantial. In November 2011, the DOE Inspector General added nuclear waste disposal to its list of significant management challenges for the department. DOE officials said that they were waiting for recommendations from the Blue Ribbon Commission on America's Nuclear Future before taking any steps to assess storage-related issues at DOE sites. The Commission has now issued its report.

What steps, if any, has DOE taken or is DOE planning to take to evaluate long-term nuclear waste storage needs and costs at its sites?

Dr. Lyons. The Department's inventory of defense high-level nuclear waste (HLW) and DOE-owned used nuclear fuel (UNF) is safely stored at sites across the DOE complex. DOE's Office of Environmental Management (EM) has completed efforts to identify information needed to extend the Department's HLW storage capability, and is in the process of finalizing a study identifying key issues related to the storage of non-commercial UNF under its responsibility.

The Blue Ribbon Commission offered a set of recommendations related to the management and disposition of UNF and HLW. A review is underway to assess the Commission's recommendations at a more detailed level. This review will provide necessary analyses to supplement those performed by the Commission and that will underpin the development of an Administration integrated and comprehensive strategy. This strategy will account for UNF and HLW disposition and will be conveyed to Congress by the end of July 2012 per the request made in the Consolidated Appropriations Act of 2012 Joint Conference Report.

Subcommittee. What work is planned, if any, to identify any gap between past and ongoing research into long-term nuclear waste storage and any additional actions needed to address DOE's unique waste storage needs?

Dr. Lyons. DOE/EM reviewed and considered technology development needs for long-term storage of DOE-owned UNF as it developed its January 2011 Research and Development Plan. Some technology development funding was provided in fiscal year 2012 to initiate work on advanced techniques to characterize material aging conditions and extension of the design life of dry storage facilities. After a new integrated and comprehensive strategy is developed and funded, EM will re-evaluate its proposed technology development activities for UNF and HLW extended storage to ensure consistency with the new strategy.

LEGISLATIVE PROPOSAL ON NUCLEAR WASTE STRATEGY

Subcommittee. Dr. Lyons, the Nuclear Waste Policy Act is still the law of the land, and Yucca Mountain is still the nation's nuclear waste repository. And there is not, in fact, consensus that this should change. The Blue Ribbon Commission has recommended additional ways to move forward on nuclear waste management, but the Administration has yet to make any legislative proposals to the Congress. In the meantime, the Department has no authority to move forward on most of the BRC's recommendations.

However we move forward — and we're ultimately going to need a second repository and possibly consolidated interim storage — the Administration is going to have to bring us into the conversation. You cannot change the Nuclear Waste Policy Act by fiat, and I would strongly caution the Department to think carefully about the process it uses.

Two weeks ago, the Secretary announced the formation of an internal working group to assess the Blue Ribbon Commission's recommendations on nuclear waste, and to develop a strategy for moving forward. This raises some serious concerns that the process is retreating more firmly behind closed doors, rather than bringing us into the fold.

Secretary Lyons, who is on this working group, and what is the process and timeline going to be moving forward leading up to any proposals made to the Congress?

Dr. Lyons. The Working Group membership consists of representatives from the Offices of Nuclear Energy, Environmental Management, National Nuclear Security Administration, Congressional and Intergovernmental Affairs, Chief Financial Officer, and General Counel. Members were appointed by their respective Principals. The purpose for the Working Group is to assess the Blue Ribbon Commission's recommendations at a more detailed level and provide analyses to support policy considerations and strategy development by the leadership of the Department and by the Administration. The Administration will provide to Congress a strategy by the end of July in response to the request from Congress to receive the Administration's strategy within six months of the release of the Commission's Report.

Subcommittee. The Blue Ribbon Commission considered interim storage, waste disposal, and other aspects of waste management, and made broad recommendations perhaps lacking in specifics. What sort of recommendations will this internal working group, and ultimately the Administration, make? How specific will they be, and how wide-ranging?

Dr. Lyons. System Design Sub-working Group is analyzing at a detailed level the range of system alternative designs relative to storage and disposal. The goal is for the strategy the Administration reports to Congress to be comprehensive.

Subcommittee. In the past several years, this Committee and the Congress have directed the Blue Ribbon Commission to consider all alternatives, including Yucca Mountain. In response, you have insisted that the Blue Ribbon Commission was not a siting commission — in other words, the Commission would have nothing to say either way about Yucca Mountain. Considering that this new working group will need to develop specific, concrete recommendations, will it consider all alternatives, including Yucca Mountain?

Dr. Lyons. Consent-based siting is one of the core considerations for the Department's working group. The Commission took the view that "...this question ultimately has to be answered by a potential host jurisdiction, using whatever means and timing it sees fit...." The Commission also believed that "...a good gauge of consent would be the willingness of affected units of government – the host states, tribes, and local communities – to enter into legally binding agreements with the facility operator...."

Any workable lasting solution for the final disposition of used fuel and defense high-level nuclear materials must first and foremost be based on sound science and the protection of the public's health and safety. But the project must also secure and sustain the consent of the communities, states, and/or tribal nation governing officials and the public they represent. This key standard has not been achieved in relation to Yucca Mountain and this site is therefore no longer considered a viable alternative.

I want to make clear that the mission of the working group is to assess the Blue Ribbon Commission's recommendations at a more detailed level, and present to Congress an overall management and disposition strategy by the end of July, consistent with the request made by the Joint Appropriations Conference Committee Report which accompanied the FY 2012 Appropriations. The working group is not an entity that will be providing siting recommendations for future repositories.

REQUEST TO USE NUCLEAR WASTE FUND BALANCES

Subcommittee. Mr. Secretary, the budget request for Nuclear Energy includes legislative language that derives $10 million from the Nuclear Waste Fund. The Congress has appropriated funds from the Nuclear Waste Fund as recently as fiscal year 2010, but always for activities specifically related to the licensing and development of Yucca Mountain. So we were somewhat surprised to see this in the request.

Even more surprising is that the budget request does not mention the purpose of this proposed funding. The request only states that the $10 million from the Nuclear Waste Fund is, "to support [Blue Ribbon Commission] recommended activities, consistent with the Nuclear Waste Policy Act." Considering that we were expecting the Blue Ribbon Commission's recommendations to lead to a dialogue about legislative proposals, I'm interested in finding out what next steps the Department is proposing to take without the approval of the Congress. Transparency in this arena is extremely important.

For what exact purposes and activities will the $10 million from the Nuclear Waste Fund be used?

Dr. Lyons. The $10M from the nuclear waste fund is included in the total $60M for R&D on storage, transportation, and disposal of used nuclear fuel and radioactive waste.

Subcommittee. For the record, can you please provide the specific authorities under the Nuclear Waste Policy Act that you intend to use?

Dr. Lyons. The specific applicable NWPA sections include 302 (d).

NEW SPENT FUEL ACTIVITIES IN FISCAL YEAR 2012

Subcommittee. Secretary Lyons, this Committee has pushed strongly for years to move forward our nations' plan for the storage and disposition of spent nuclear fuel. That is why we developed Yucca Mountain, and that is why we have been so concerned with the Department's position on Yucca Mountain.

Regardless of the outcome, we will need more than one repository, and we will need better technology for transportation and storage of spent fuel. To that end, we provided funding in fiscal year 2012 for several new waste management research activities, including development of standardized spent fuel casks; research into the science of nuclear waste repositories; and research into the aging and transportation of spent fuel casks.

The development of standardized spent fuel casks is an important step for the transporting of fuel and its ultimate disposal, and the Congress provided funding in fiscal year 2012 to start a program focusing on standardization. How long will this program need to complete its goals?

Dr. Lyons. On March 15, 2012, the DOE completed a "Draft Implementation Plan on the Development and Licensing of Standardized Transportation, Aging, and Disposition Canisters." When finalized, the plan will contain the goals, objectives, projected costs and schedule associated with its implementation. The licensing of a standardized canister system is a complex undertaking because of the significant competing and often contradictory requirements. The plan will ensure that future development and design of standardized canister-based systems be capable of obtaining NRC Certificate(s) of Compliance (CoC) in accordance with 10 CFR Part 71 and 10 CFR Part 72. The plan will also include the development of supporting analyses to address aging and disposal at a future repository site. It is anticipated that it will take a minimum of three years to design a standardized system and then receive a CoC from the NRC.

Subcommittee. How is the Department progressing in starting the other new waste management activities funded in fiscal year 2012?

Dr. Lyons. The Department focus for FY 2012 is on activities with outcomes that will be required, regardless of the final destination of the used nuclear fuel. This work includes research for long term storage, updating of numerical and physical models needed to evaluate possible geologic repositories, assessment of transportation policies and procedures, and the possible pursuit of interim storage. Interim storage is being evaluated to address, among other issues, the possibility of reducing current costs at the decommissioned reactor sites. The primary new activity that has been started is work on a standardized canister system that is discussed in 30-1, above. As for beginning other new waste management activities, the Department is still in the process of evaluating the BRC recommendations to determine the best path forward.

Subcommittee. Are all of these activities in the 2013 budget request, or does the Department propose to discontinue some of them?

Dr. Lyons. At present, all the activities the FY 2013 budget request are needed to make progress for used fuel management. The FY 2013 budget request includes $60 million for R&D on storage, transportation, and disposal of nuclear waste. This aligns with continued activities that support the near-term recommendations put forward by the Blue Ribbon Commission on America's Nuclear Future. The budget request continues activities initiated in FY 2012 and specifically focuses on evaluating consolidated interim storage and transportation issues (focused initially on decommissioned sites); working with industry to develop standardized approaches to used fuel management; conducting material testing to support extended storage of used fuel; revisit and prepare a report on plans to address recommendations identified by the National Academy of Sciences transportation report; and initiating research on geologic disposal alternative environments, e.g. system modeling, engineered barriers, natural barriers, evaluation of design concepts, and experiments.

LONG-TERM WASTE CONFIDENCE UPDATE

Subcommittee. Mr. Chairman, in 2010 the NRC decided on a waste confidence rule, stating that it is safe to store spent fuel at a reactor site for 60 years beyond the reactor's licensed lifetime. Also in the last several years, the Administration has attempted to take Yucca Mountain off the table, but left itself with no authority to pursue other alternatives and no consensus on how to consolidate our nuclear waste liabilities.

In early January, the NRC announced that it has begun working to update its Waste Confidence ruling. This time, the NRC is considering extending waste confidence to 200 years beyond reactors' licensed life.

Yucca Mountain is the obvious near-term means to remove fuel from reactor sites. Considering that the waste confidence finding won't need to be updated until 2059, some could conclude that this waste confidence update is simply is a band-aid that hides the problem we have — that is, a lack of a way to move forward without Yucca Mountain.

Mr. Chairman, what is the rationale for performing the waste confidence update in the next several years? Is there a pressing need?

Would the need to make this update persist if the Administration had moved forward with Yucca Mountain?

Chairman Jaczko. The Commission has determined that it would be prudent at this time to develop a potential long-term update of waste confidence to ensure that the waste confidence rule reflects current circumstances, such as possible changes in policy concerning spent fuel management, and developments in technical knowledge.

Subcommittee. How did the NRC decide to consider 200 years for the update?

Chairman Jaczko. These technical analyses consider the effects of aging on the spent fuel itself and on the systems used for spent fuel storage. The 200-year timeframe specifically refers to the period for which impacts would be assessed in the Environmental Impact Statement (EIS). This assessment period begins in the mid-century (approximately 2050), which is when the oldest spent fuel considered in the current (2010) waste confidence decision will have reached about 100 years of aging. The EIS assessment then extends until approximately 2250. So, the approximately 100 years of aging assumed as of 2050 (for the oldest spent fuel), in addition to the 200-year span the NRC chose for analyzing impacts in the EIS, provide for a 300-year total time for aging of spent fuel, consistent with the prevailing research methods and technical analyses being developed by DOE, universities, industry groups, and several other countries.

FUEL CYCLE AND BLUE RIBBON COMMISSION RECOMMENDATIONS

Subcommittee. Dr. Lyons, the Blue Ribbon Commission did not consider any fuel cycles other than our current "once-through" approach. Can you develop a strategic proposal without considering this angle?

Dr. Lyons. The Blue Ribbon Commission concluded that "...while new reactor and fuel cycle technologies may hold promise for achieving substantial benefits...and therefore merit continued public and private R&D investment, no currently available or reasonably foreseeable reactor and fuel cycle technology developments—including advances in reprocessing and recycling technologies—have the potential to fundamentally alter the waste management challenge this nation confronts over at least the next several decades, if not longer." Consistent with this conclusion, we will continue to invest in advanced fuel cycle research and development (R&D), while recognizing that, in the near-term, nuclear materials management and disposition system design will not include UNF reprocessing or recycling. R&D on advanced technologies may provide an opportunity in the more distant future to consider these alternative technologies.

COMMUNITIES INTERESTED IN CONSOLIDATED STORAGE FACILITIES

Subcommittee. As a nation, there is a real need for the Yucca Mountain repository, and we will ultimately need an additional repository and possibly a consolidated storage facility. There is at least one community in the United States, and possibly more, that has publicly and continuously stated its interest in hosting a consolidated storage facility.

Is the Department reaching out to that community, and will it reach out to others that may raise their hands? Now, rather than wait months or years?

Dr. Lyons. The Blue Ribbon Commission recommended that the nation undertake a new, consent-based approach to siting future nuclear materials management and disposition facilities. The BRC emphasized the importance of having broad-based support for hosting nuclear materials management and disposition facilities, including support of all affected units of tribal, state, regional, and local government, and the host community. DOE is considering the recommended consent-based approach as part of its overall strategy-development process, including how to address early expressions of interest in hosting these facilities.

Subcommittee. Would the Department consider contracting with an interested community and private company for the design and development of a consolidated storage facility?

Dr. Lyons. DOE's strategy will cover alternative options for siting and operating a consolidated storage facility.

YUCCA TERMINATION

RETENTION OF YUCCA MOUNTAIN EXPERTISE

Subcommittee. Much to the opposition of this Committee and the House of Representatives, the Department of Energy has disassembled the Office of Civilian Radioactive Waste Management, which managed the Yucca Mountain licensing process. That office housed many people whose knowledge and expertise represent billions of dollars of taxpayer investment. Since the Department proposed to shutter the Yucca Mountain repository, the Committee has reiterated the importance of preserving that expertise, regardless of what happens to Yucca Mountain.

In fiscal year 2012, the budget request proposed and the Congress funded an increase to your office's program direction in order to preserve the personnel with Yucca Mountain expertise.

Dr. Lyons. A number of personnel from the Office of Civilian Radioactive Waste Management (OCRWM) went to other offices within DOE, as well as to other agencies.

Subcommittee. Where does the personnel from the Office of Civilian Radioactive Waste Management reside?

How many of the original personnel were transferred to the Office of Nuclear Energy? Where are the remaining personnel?

Dr. Lyons. Twenty-one of the personnel from OCRWM were employed by the Office of Nuclear Energy. OCRWM personnel also went to the DOE Offices of Environmental Management, Energy Efficiency and Renewable Energy, Management and General Counsel.

DC CIRCUIT COURT LAWSUIT AND POSSIBILITY OF YUCCA RESTART

Subcommittee. As the case against the NRC regarding the Yucca Mountain license application moves through the courts, it is very possible that you will be ordered to continue the licensing process. I'd like to hear, from each of you, how much it would cost to stand up the necessary team to resume the application, if the Court orders the Administration to open the application process back up.

Dr. Lyons?

Dr. Lyons, to what degree has the Department dismantled its program that works on the Yucca Mountain license application?

Dr. Lyons. The Department of Energy (DOE) is committed to preserving the scientific and other information regarding a repository at Yucca Mountain, Nevada, that was developed by the Yucca Mountain Project (YMP). Moreover, the Department has repeatedly affirmed that it will resume the licensing proceeding if ordered to do so. As more fully discussed below, DOE has taken numerous steps to preserve information and to ensure that, while there would be some delay, it could resume the licensing proceeding if ordered, provided Congress appropriates it money to do so.

As an integral part of planning for the termination of the Office of Civilian Radioactive Waste Management (OCRWM), senior DOE management worked with DOE's Office of Legacy Management (LM) to develop comprehensive and systematic plans for transitioning, archiving, and preserving the records, information systems, and scientific knowledge from the YMP that were previously managed by the OCRWM. These plans and implementing processes were designed to ensure: (1) preservation of the information and electronic systems for storing and retrieving the information; (2) conformity to regulatory requirements for the preservation of Federal records; and (3) compliance with applicable Nuclear Regulatory Commission (NRC) regulations and Atomic Safety and Licensing Board (ASLB) orders in the Yucca Mountain licensing proceeding.

DOE has preserved its Licensing Support Network (LSN) Collection of some 3.6 million documents and over 30 million pages relevant to the Yucca

Mountain licensing proceeding. DOE kept its LSN participant website compliant and accessible via the NRC's LSN portal until the NRC shut down its LSN Portal on August 5, 2011. Nevertheless, an electronic copy of the DOE LSN Collection previously available through the NRC's LSN Portal is preserved at DOE's Office of Legacy Management Business Center (LMBC) in Morgantown, West Virginia,[1] and DOE's LSN support contractor maintains a searchable version of the DOE LSN Collection at a facility near Washington, D.C. In addition, in August 2011 DOE provided the NRC with an electronic copy of its LSN Collection previously available through the LSN Portal. An electronic copy of the DOE LSN Collection previously available through the LSN Portal has also been provided to the State of Nevada and other parties to the Yucca Mountain licensing proceeding that have requested a copy.

In addition to the LSN, DOE has preserved the YMP Records Information System (RIS) and other information systems previously operated by OCRWM and its contractors. DOE completed processing YMP records into the RIS and has moved the hardware as well as software for the RIS to the LMBC. The RIS is preserved in searchable format. Beyond the LSN and RIS, DOE has successfully consolidated and moved more than 20 other former YMP information systems from Las Vegas, NV, to the LMBC for preservation. To help ensure operational readiness of legacy YMP information systems, archive backup tapes of the legacy YMP information systems have been created and are preserved. Other YMP information systems are being preserved by Sandia National Laboratories.

With the exception of certain contract administration records, all YMP records have been archived in accordance with the requirements of the Federal Records Act and the regulations of the National Archives and Records Administration (NARA) and are stored at the NARA-approved LMBC. The contract administration files will be transferred from DOE's Oak Ridge Office to the LMBC and archived at the LMBC when contract closeout activities are completed.

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[1] In accordance with ASLB Order dated April 11, 2011 (Docket No. 63-001-HLW, ASLBP No. 09-892-HLW-CAB04), DOE (through LM) has converted and preserved all of the LSN documents previously available through the NRC LSN Portal in "PDF" format. DOE also is preserving the documentary material included in its LSN collection that was not available through the NRC LSN Portal either because of a claim of privilege or because the documentary material could not be electronically imaged.

To preserve the non-record information developed by the YMP, core samples and other physical evidence are being maintained by DOE in the Sample Management Facility (SMF) located on the National Nuclear Security Site (NNSS) near the Yucca Mountain site. The SMF is a secured, unmanned, "cold, dry and dark" facility.

DOE has repeatedly affirmed that, subject to the availability of appropriated funds, it will resume an active licensing proceeding if required to do so. Perhaps most importantly, the Yucca Mountain repository license application was developed under procedures requiring extensive and transparent documentation, which would facilitate DOE's ability to resume the licensing proceedings if required to do so. Moreover, DOE has taken numerous additional steps to ensure that it can support an active licensing proceeding, provided Congress appropriates funds with which to do so. For example, DOE has preserved core federal capabilities in the areas of science and program management by retaining key OCWRM personnel within other Departmental units. Specifically, DOE's Office of Nuclear Energy (NE) expanded its Office of Used Nuclear Fuel Disposition Research and Development to ensure that the expertise that had been developed within OCWRM could be maintained within the Department. Additionally, the vast majority of contractor employees who worked on the YMP did so under contracts with Sandia National Laboratories and USA RS. These contracts have not been terminated, and through them the Department could access substantial contractor expertise if needed. DOE has also maintained its two legal services contracts, which would be available to support the Department in the licensing proceedings in the event they resume.

In summary, DOE has carefully preserved the scientific and other information developed by the YMP. It has also taken steps to ensure that, while there would be some delay, DOE could resume the licensing proceeding if so ordered, provided Congress appropriates it money with which to do so.

Subcommittee. Chairman Jaczko?

Chairman Jaczko. In FY 2011, the NRC completed orderly shutdown of its High-Level Waste Program associated with the technical review of the DOE license application for the proposed Yucca Mountain repository. The actual cost to resume the review is difficult to estimate. Any estimate provided at this point would be purely speculative.

Subcommittee. Mr. Chairman, how much carryover funding do you have from the Nuclear Waste Fund that could be put to restarting the Yucca Mountain licensing process?

Chairman Jaczko. As of March 30, 2012, the NRC has approximately $10 million of unobligated funds from the Nuclear Waste Fund. Consistent with congressional appropriations, the NRC would require congressional approval to spend these funds.

Subcommittee. We will clearly have to wait and see what the court rules. But I certainly hope that in the meantime, both of your organizations are taking a prudent and responsible course so that you can follow the courts' eventual ruling.

YUCCA MOUNTAIN LIABILITY

Subcommittee. Dr. Lyons, the Administration's misguided attempts to kill Yucca Mountain have simply extended the amount of time nuclear waste is left on-site and opened the U.S. government to more and more lawsuits. Your fiscal year 2011 Financial Report shows the estimated liability our taxpayers are now faced with to be over $19 billion, nearly $4 billion — that's Billion, with a "B" — more than a year ago. Some estimate that this could reach as high as $50 billion.

Your Department is charged with defending the President's irresponsible Yucca Mountain policy, which is racking up billions and billions more in liabilities each year. What's your estimate of the ultimate liability our taxpayers are going to be asked to pay?

Dr. Lyons. The Department's latest estimate for the Government's remaining liability as of October 30, 2011 was $19.1 billion.

NUCLEAR WASTE FUND FEES

Subcommittee. Dr. Lyons, the balance of the Nuclear Waste Fund at the end of fiscal year 2012 is projected to be over $28 billion, with a market value of many billions more than that. Most of this money was taken as a tax on users of nuclear energy, and each year the government collects over $2 billion more through new fees and interest, even though you've killed the only thing it can be spent on. We've contemplated rescinding the money to give it back to the taxpayers, but given the accounting rules, this would actually increase the deficit. Instead, we're holding out hope that the reason of the courts will prevail over the political deals that this Administration has made. However, I think it's immoral to continue to collect these fees.

Is the Administration going to propose halting the collection of these funds? If not, why not?

Dr. Lyons. The Nuclear Waste Policy Act establishes a fee of one tenth of a cent per kilowatt-hour of electricity generated and sold, to be paid by the nuclear utilities in order to defray the total lifetime cost of storage and ultimate disposal for waste generated by those utilities. This fee results in the deposit of approximately $750 million of receipts annually into the Nuclear Waste Fund. The Act further provides that the Secretary shall review the adequacy of this fee annually and propose an adjustment of the fee to Congress only upon determining that either insufficient or excess funds are being collected to defray the total lifetime costs of the Department's waste management program.

The Department completed its most recent annual review of the adequacy of the Nuclear Waste Fund fee in December 2011. That review concluded that, given the Department's continuing obligation to take title to and ultimately dispose of nuclear waste – an obligation the Department has continually affirmed it remains committed to meeting – there is no reasonable evidentiary basis to determine that the current fee is either insufficient or excessive. Without such evidence, the Secretary cannot lawfully "suspend" collection of the fee.

QUESTIONS FROM CHAIRMAN FRELINGHUYSEN OF NEW JERSEY

PROPOSED CUTS TO NUCLEAR ENERGY RESEARCH AND DEVELOPMENT

Chairman Frelinghuysen. Secretary Lyons, the Administration has made many public comments in support of nuclear power, as a clean, domestic source of energy that also supports American jobs and manufacturing. Just several weeks ago, Secretary Chu appeared at the Vogtle plant in Georgia, expressing his support for nuclear power and its importance in, as he put it, "the global race for the nuclear energy jobs of tomorrow."

Unfortunately, that rhetoric does not appear to be backed up by funding. The budget request for fiscal year 2013 reduces funding for Nuclear Energy research programs by $93 million — a 12 percent cut.

Secretary Lyons, at a time when many other nations are moving forward rapidly in the nuclear sector, does this proposed cut to the nuclear energy budget hurt our chances to compete and meet our future energy needs?

Dr. Lyons. Administrative support for the SMR program and success of the NP2010 program may provide the best opportunity for increased global competitiveness.

Chairman Frelinghuysen. Secretary Lyons, can you provide for the record your suggestions on how an additional $50 million and $100 million would best be used within the Nuclear Energy programs?

Dr. Lyons. Congressman Frelinghuysen, thank you for your ongoing support for Nuclear Energy programs at the Department. I think you and I both agree that there is tremendous potential for America to take a leadership role in the expansion of safe and sustainable nuclear energy technologies around the world. Our fiscal year 2013 budget request reflects the President's priorities in this area – designing and licensing commercially deployable small modular reactors, making progress on solutions to the back-end of the fuel cycle, making targeted investments in supporting the existing fleet of reactors, and maintaining our research and development infrastructure.

CUT TO NUCLEAR MANUFACTURING ACTIVITIES

Chairman Frelinghuysen. Secretary Lyons, clearly some of the programs proposed by the Department in recent years support American manufacturing in the nuclear sector. The small modular reactor program, for example, is important for this and other reasons, as the smaller reactor vessels would allow much more of the reactor components to be made here at home.

At the same time, the budget request reduces funding for the 1-year old Crosscutting Technology Development research program, claiming that the reduction partly "reflects no new investments in the areas of manufacturing methods… due to reprioritization."

Secretary Lyons, if manufacturing is such a priority for the President this year, why does the Department cut research that supports American manufacturing for Nuclear Energy technologies?

Dr. Lyons. The Advanced Methods for Manufacturing (AMM) program is an important program that aligns with the President's economic efforts by providing research, development, and demonstration on innovative methods for the manufacturing of nuclear components and equipment. Projects will be initiated at the end of FY 2012 through a competitive process that will continue in FY 2013 through the end of FY 2014. AMM also plans to issue a roadmap in FY 2012 to guide future solicited research and technology development in the event that additional funding becomes available in future years.

Because of the ongoing projects, the Department decided to defer additional AMM projects in FY 2013 so that it could support other important areas within this account rather than spreading the budget reduction to the other subprograms that were already at minimum levels. The Nuclear Energy Advanced Modeling and Simulation, the Reactor Materials, and the Advanced Sensors and Instrumentation subprograms are priorities because they have the potential to make the greatest impacts in nuclear technology development, provide needed capabilities common across NE R&D programs, deliver enabling technologies beyond individual programs, create capabilities needed by the NE R&D enterprise, and undertake high risk research to overcome design limitations. Thus, the AMM subprogram was deferred to provide a stronger support to these priority programs.

Additionally, other agencies are promoting advanced manufacturing; for example, the National Institute of Standards and Technology is requesting funding in FY 2013 to help test and accelerate the development of new technologies created in the advanced manufacturing sector. NE will work with NIST and standards setting bodies to make sure implementing codes and standards are available to support new AMM technologies.

CHAIRMAN'S VOTE AGAINST NEW VOGTLE PLANT LICENSE

Chairman Frelinghuysen. Chairman Jaczko, on February 9, the Commission voted to approve construction of the new reactor units at the Vogtle plant in Georgia. You voted against approval of the license, saying that you couldn't support the license without a binding agreement that the licensee and its partners would operate the new reactors with safety enhancements recommended by the NRC after the events at Fukushima.

Mr. Chairman, do you currently have such binding agreements from all licensees of the operating reactors across the country?

Will the NRC have the authority to impose the same safety enhancements on this new plant as it does on other reactors currently operating?

Then I suppose I don't understand your disapproval of the license. You would seem to imply that this new reactor is not safe enough to operate — does this mean that you also think our current fleet of operating reactors should be shut down until the NRC's recommendations following Fukushima are implemented?

How long would you have waited before approving the Vogtle license? How many construction and permanent jobs would that have deferred, and how much more would that put us at risk of ceding the nuclear industry to overseas companies and manufacturing?

From what I understand, Mr. Chairman, these new reactor designs are *even* safer than our current fleet of reactors, and their passive safety features would make them even more resistant to a Fukushima-like incident. Given these advantages and the NRC's authority to require future safety enhancements, it seems inconsistent to vote against the approval.

Chairman Jaczko. As I testified at the hearing, the license that was in front of the Commission was for a new reactor at the Vogtle site. A new licensee is different from an existing licensee in terms of the agency's expectation. The Commission has a long-standing policy statement, the Advanced Reactor Policy Statement, that our expectation is that the new reactors will be inherently safer. It is part of the reason for the interest in passive reactor technology which the AP1000 embodies.

At the same time the Commission was preparing to make decisions on the recommendations from the Japan lessons learned task force report. The approach I laid out in my vote would have provided a consistent approach that would have required a clear commitment from new licensees that before a new reactor began operation, it would be in compliance with any new requirements implemented as a result of our review of the events in Japan.

By not requiring a license condition, I believe it will be more difficult for us as the new reactor licensing work continues concurrent with the identification of new safety requirements to come up with special approaches to incorporate those decisions. I continue to believe that having a consistent requirement for all new reactor licensees would have been the common sense way to move forward. In addition, given the enhanced safety of the AP1000, it should not have been challenging for Vogtle to meet this commitment.

KEEPING UP WITH LICENSE APPLICATIONS

Chairman Frelinghuysen. Chairman Jaczko, quite a few applications for new reactor licenses, for license extensions, or for power uprates are currently under review or expected in the next several years.

Do funding levels in the budget request provide adequate staff to keep up with these reviews?

What are you doing to keep pace with applications? What are you doing to either staff up or smooth out any expected spikes in applications?

Chairman Jaczko. Yes. The NRC currently has sufficient resources to make progress on all new reactor applications that are currently under review. The NRC ensures funding for application reviews that support near term construction and operating plans. The NRC's planning, budgeting, and performance management process ensures sufficient funding for the balance of application reviews that support more long-range construction and operation goals. If there would be a shortage, it likely would be not so much in the area of financial resources, but in critical skill sets and niche expertise.

Yes. Licensees are surveyed approximately every six months to determine the expected number of power up-rate submittals. This information is used to ensure that future budget requests reflect the most current information. Based on our current expectation for power up-rate submittals in the next several years, there are sufficient resources in budget requests to review both the in-house, as well as the anticipated, power up-rate submittals.

Chairman Frelinghuysen. What is the outlook for 2014 and beyond? Do you expect it may be difficult to keep up with application reviews in the coming years?

Chairman Jaczko. In 2014, the NRC expects to have under review two design certification renewals, three design certification applications, four combined license applications, and four early site permit applications. The NRC also currently expects to have two advanced reactor design certification applications under review, a construction permit application, and an early site permit application for an advanced reactor design. The NRC planning, budgeting, and performance management process will ensure that appropriate agency resources will be provided to support these reviews consistent with agency priorities. The agency uses an information gathering process to solicit interest in the submittal of new or advanced reactor applications. The agency incorporates this information into its future budget planning during the budget formulation process to ensure that appropriate resources are factored into future agency budget requests.

Industry surveys of expected submittals indicate a substantial decrease in the power up-rate review workload in FY 2014. Based upon an analysis of current power up-rate workload and licensee survey input, challenges to review power up-rate submittals based on the expected number of submittals in FY 2014 and beyond are not anticipated. Based on projections of power up-rate submittals, there is no expectation for spikes in applications. The staff will continue to communicate openly with licensees regarding the execution of these complex licensing actions.

PROPOSED RESEARCH IN CONTRAVENTION TO NUCLEAR WASTE POLICY ACT

Chairman Frelinghuysen. Secretary Lyons, as you know, the Nuclear Waste Policy Act is currently the law of the land for spent nuclear fuel, and it specifies that Yucca Mountain is the nation's spent fuel disposition site.

I understand that the Blue Ribbon Commission has made a variety of recommendations, some related to interim storage, some relating to voluntary licensing for storage and disposal sites, and some in other areas. And we are still awaiting any legislative requests. But as of right now, the will of the Congress is to license Yucca Mountain for nuclear waste disposal.

It then seems odd that the Department has requested funding for activities in preparation of implementing consolidated interim storage facilities, and in preparation of volunteer siting processes.

Why has the Department requested funds for activities before it has requested legislation allowing those activities — and as importantly, before it knows if the Congress would approve such legislation?

Dr. Lyons. At this point, the Department is working to evaluate and implement activities that will be required, regardless of the final destination of the used nuclear fuel. The Department is still in the process of evaluating the BRC recommendations to determine what it believes to be the best path forward. The Department will work with the broader Administration and with Congress to refresh the nation's approach to the management and disposition of used nuclear fuel and high-level nuclear waste and on the required legislation for executing this approach.

Chairman Frelinghuysen. When will the Department officially request legislative changes?

Dr. Lyons. The completion of the Departmental review and the development of the Administration's position on an integrated strategy is targeted for completion by the end of July. This timing conforms to Congress's request that the Administration communicate its strategy within six months of the release of the Commission's report.

YUCCA TERMINATION AND MARCH 22 DC CIRCUIT COURT LAWSUIT

Chairman Frelinghuysen. At the time of our hearing last year, we awaited the D.C. Circuit Court to rule on the Department's withdrawal of the Yucca Mountain license application. The court delayed its ruling until after the NRC ruled on the issue. Well, the NRC has since voted — a tie vote, actually — and now the court process is back on track.

In May, the D.C. Circuit Court will hear further arguments in the case against the NRC. In other words, as we said last year, this issue is not dead. And so it is warranted to revisit some concerns we had last year.

If the Court rules against the NRC, will you appeal the decision if it goes against the license withdrawal, as it should?

When does this end, and how are the NRC and the Department ensuring that their actions take into consideration that this lawsuit is still moving its way through the courts?

Chairman Jaczko. The NRC will study any decision the court issues, and consider then whether further judicial review is appropriate. NRC has the ability to resume its review, including the adjudication, if a court order so requires, or if Congress appropriates sufficient funds and provides sufficient direction for that purpose.

QUESTIONS FROM MR. SIMPSON OF IDAHO

R&D FUNDING

Mr. Simpson. Secretary Lyons, the FY2013 budget request includes funds to develop accident tolerant fuel and advanced fuel cycle technologies. Can you please tell me about the new experimental capabilities you need to do this type of R&D?

Dr. Lyons. In support of accident tolerant fuel development and advanced fuel cycle technologies, the fiscal year 2013 request for NE includes a new line construction project to establish advanced post-irradiation examination capabilities to improve the understanding of radioactive and irradiated material behaviors at the nano- and subatomic scales. Additionally, the NE request continues efforts to identify alternatives to resume transient nuclear fuel testing to assess and validate new accident tolerant fuels.

Mr. Simpson. Secretary Lyons, I am very concerned about the proposed budget cuts to the advanced reactor program. As you recall, last year the Senate proposed a large cut to reactor programs and we had to work hard in conference to bring that number up. I am afraid, if we start at the lower number you propose in FY2013, we will not have much of a reactor program when we are done. I think we need an R&D program balanced between reactors and fuel cycle development. As we look to strengthen the reactor R&D budget, please share with me the value you see in completing the NGNP fuel development program.

Secretary Lyons, can you describe to me the NGNP NRC licensing activities that your FY13 budget funds?

Dr. Lyons. In Fiscal Year 2013 the Department will continue to engage with the NRC to address key issues defined in several assessment reports issued by the NRC in Fiscal Year 2012. Topics covered in those reports include fuel qualification; mechanistic source terms; defense in depth; licensing basis event selection; safety classification of structures, systems and components; and high temperature materials qualification and licensing. The Department will also work with the NRC on the development of a license application guide for high temperature gas-cooled reactors (HTGR). Lastly, the Department plans to continue to support the construction and initial operation of the High Temperature Test Facility at Oregon State University to be used by the NRC for experimental validation of HTGR design methodologies.

Mr. Simpson. Is DOE actively working with the NRC to advance the NGNP project and HTGR technology?

Dr. Lyons. There continues to be strong activity between the Department and the NRC on formulating the licensing framework for HTGR technology. Both parties participate in bi-weekly teleconferences to update status on documents under review and stay abreast of agency activities relevant to the licensing efforts. Periodic drop-in meetings as well as public meetings provide opportunities for face-to-face engagement on topics under discussion. Finally, DOE and NRC managers have recently initiated a series of quarterly meetings at the Deputy Assistant Secretary level to ensure that issues are properly elevated and mutual prioritization is agreed upon. The Department provides funds to the NRC through an interagency agreement for them to accomplish this work.

Mr. Simpson. Secretary Lyons, there are facilities like the large, modern spent fuel pool at the INL site currently under the control of the DOE Environmental Management program.

As the cleanup work at INL winds down, are you talking to your counterparts at EM to discuss the future status of these facilities? If so, please provide a status report on those discussions.

Dr. Lyons. The Office of Nuclear Energy is working with Environmental Management (EM) counterparts to determine the long-term vision for the Idaho Nuclear Technology and Engineering Center (INTEC) and its facilities. A Project Execution Plan is under development and activities are ongoing to evaluate the INL mission needs as they apply to selected facilities owned by EM at the INTEC. Senior management from DOE EM, NE and Idaho National Laboratory are determining the mission relevant facilities, resources and capabilities that selected INTEC facilities can provide. Since these activities are in the preliminary phases, the FY 2013 request does not include any funding for facility transfers.

INDUSTRY INVOLVEMENT

Mr. Simpson. Secretary Lyons, last year I supported the effort in Congress to increase funding for the industry cost-shared program to help extend the life of the current fleet of reactors. I think we need to keep this important program level funded and I would like you to explain why this program is so valuable.

Dr. Lyons. Nuclear power has safety, reliably, and economically contributed around 20 percent of U.S. electricity over the last two decades. In terms of non-greenhouse-gas emitting electricity production, nuclear power provides over 70 percent. The U.S. Government has a strategic interest in supporting their continued safe and economic operation in support of climate change objectives, energy security, and providing U.S. citizens with affordable electricity. The Light Water Reactor Sustainability (LWRS) program addresses the fundamental scientific questions related to material degradation and plant aging where private investment or capabilities are insufficient to make progress on broadly applicable technology issues. The LWRS program creates an environment, by reducing uncertainties and risk, that provides incentives for industry to make the substantial private investments necessary to support their continued operation. Industry also has an incentive, so cost-sharing is being employed where appropriate. The benefits of this research will also extend to the next generation of nuclear technology being deployed and under development.

Mr. Simpson. Secretary Lyons, the House appropriations bill last year included report language recommending that you compete 10 percent of your budget between industry, universities and the labs. I know you have extensive programs working with industry, universities and the labs. Can you tell me how you approach decisions about where to spend your money?

Dr. Lyons. Mr. Simpson, our approach to deciding how best to direct our program dollars is to evaluate which entity is best suited to perform a specified work scope. In cases where the work involves a significant amount of interactive program development, technical integration or highly specialized nuclear facilities we normally turn to our National Laboratories. As a matter of policy we work with our National Laboratories to direct up to 20% of our research and development funding to Universities. University led R&D adds significant diversity and new perspectives to our efforts and also helps build the future generations of scientific researchers for our national nuclear imperatives. Our National Laboratories and University programs routinely engage industry in R&D and infrastructure programs. In many cases, we directly engage industry through competitively selected, cost-shared arrangements with industry such as in the Small Modular Reactor Licensing Technical Support Program.

FUNDING TREND

Mr. Simpson. Secretary Lyons, your budget is proposed to decline by 10 percent in FY2013 and the additional responsibilities that were added to your program when the Yucca Mountain project was terminated seem to be growing. Should I be concerned about the long-term implications of this trend?

Dr. Lyons. In the austere budget to which the nuclear energy program is held, difficult prioritizations had to be made. As a consequence, in this process, we are reducing programs that have strong potential for long term contributions to future clean energy portfolios.

Mr. Simpson. Secretary Lyons, do you believe the FY13 budget request for the Next Generation Nuclear Plant project is sufficient to maintain and advance the necessary research and development on fuels and materials so that a first of a kind reactor could be completed by 2023 or so?

Dr. Lyons. The Fiscal Year 2013 request of $21,157,000 for the Next Generation Nuclear Plant (NGNP) program is sufficient to fund the research activities in fuels and graphites. Given current fiscal constraints, competing priorities, and projected cost of the prototype, the Department is not proceeding with design or construction activities at this time. The program will continue to focus on high temperature reactor research and development activities, interactions with the Nuclear Regulatory Commission to develop a licensing framework, and establishment of a public private partnership until conditions warrant a change in direction.

Mr. Simpson. I understand that the fuel irradiation and testing has gone extremely well. Can you tell me a little bit about this?

Dr. Lyons. The Advanced Gas Reactor (AGR) Fuel Development Program consists of eight irradiation experiments and associated post irradiation activities to confirm irradiation performance characteristics and fabrication methods for TRISO-coated particle fuel, and to facilitate licensing by the Nuclear Regulatory Commission. The AGR-1 TRISO fuel test achieved a new international record for irradiation testing of particle fuel for use in the Next Generation Nuclear Plant (NGNP) Demonstration Project. That three-year test achieved 19% burn-up of the initial low enriched uranium content and subjected more than 300,000 TRISO fuel particles to intense neutron irradiation and temperatures around 1,250 degrees Celsius. No fuel particle failures occurred during this test, thus demonstrating the robustness of TRISO particle fuel. Post irradiation examinations and testing under postulated accident conditions of the AGR-1 specimens have begun at the Idaho National Laboratory (INL) and Oak Ridge National Laboratory (ORNL) hot cell facilities.

The second TRISO fuel test (AGR-2) is currently half-way through its irradiation campaign, and includes fuel specimens manufactured with pilot-scale commercial equipment. The AGR-3 and AGR-4 experiments were initiated in December 2011 and contain unique designed-to-fail TRISO fuel particles. AGR-2, and AGR-3/4 are performing as planned and are scheduled to be removed from the reactor in March 2013 and May 2013, respectively. The AGR Fuel program has also completed pilot-scale TRISO fuel manufacturing development with an industrial fuel vendor. This capability can be used for producing the NGNP's first core TRISO fuel

Secretary Lyons, the FY2013 budget request proposes to slightly reduce funding for the Small Modular Reactor licensing and design support and pushes the significant increases contained in the five year budget plan into the future. Wouldn’t a program that gradually increases funding versus an up and down budget profile make more sense?

Dr. Lyons. Yes, but because the program funding was not provided until the end of calendar year 2012, and we must execute a complex and lengthy selection and award process for financial assistance, we anticipate having to carry over most of the FY12 funding into FY13. At that point, the approximately $130 million would be available to invest in SMR certification and licensing efforts through FY13. The Office of Nuclear Energy believes that this budget is appropriate to sustain the program through FY13, but we will need to increase the budget requests in the outyears in order to meet the program goals of accelerating the completion of the certification and licensing for the awarded projects.

NRC

Mr. Simpson. Chairman Jazcko, the most important job you have is making sure the 104 nuclear power plants in the US operate safely and the public knows we have a competent, effective regulator overseeing reactor operations. With that in mind, I am most concerned that this public spat between you and your fellow commissioners has severely tarnished the reputation of the NRC and this campaign to say you care more about safety than the other commissioners is wrong. I believe leadership requires responsibility. What are you doing to improve the working relationship between the NRC Commissioners?

Chairman Jaczko. As I testified at the hearing, I have had a number of meeting with my colleagues and talked to them about these concerns. I have had a number of meetings with the staff to talk to them about anything I may have done that somebody viewed as inappropriate or as creating a challenge. And so I have worked to address any misperceptions or miscommunications that have been made.

Throughout my tenure I have worked to ensure effective communications. Since the hearing last December, I have redoubled those efforts.

There will always be disagreements among commissioners. That is the purpose of a Commission; to ensure differing positions are taken into consideration when determining policy. I think it is a very important tenet of our Commission that we are able to publicly address disagreements and differing views.

The performance of the agency continues to be at a very high level and has been since the time I became Chairman. The agency continues to be focused on its mission. Every day I come to work, I work to do the job with integrity and diligence, and that has not changed.

Mr. Simpson. Chairman Jaczko, Your budget justification documents "sustained industry interest in reprocessing spent fuel", and considers NRC efforts to develop a licensing framework for reprocessing facilities as one of the agency's "significant accomplishments" in FY11. Yet your FY13 budget calls for a 28% reduction in funding for this effort.

Why? Will this reduction further delay the rulemaking process? If so, by how long? What resource commitment is necessary to avoid further schedule slippage for final rulemaking?

Chairman Jaczko. The FY 2013 budget reflects a decrease in resources for the reprocessing rulemaking to address resource requirements of other higher priority activities that have a more significant and immediate impact on the safe operations of existing facilities, facilities under construction, and new licensing applications. At this time, the reprocessing rulemaking schedule is extended to FY 2019.

Mr. Simpson. Chairman Jazcko, Secretary Chu testified before this subcommittee that if the court rules the Administration cannot withdraw the Yucca Mountain license application, DOE will proceed with the license application. Can you tell us how much the NRC would need to resume its review of the Yucca Mountain license application?

Chairman Jaczko. The actual cost to resume the review is difficult to estimate. Any estimate provided at this point would be purely speculative.

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